AUTOMOTIVE INDUSTRIES

FEBRUARY 1, 1953

AUTOMOTIVE and AVIATION MANUFACTURING
CIVILIAN AND DEFENSE
ENGINEERING • PRODUCTION • MANAGEMENT

In This Issue . . . 1953 Studebaker · · · · Buick's V-8 Engine Plant · · · · Simplified Fender Method · · · · Ford Tractor Engine Plant · · · · New Amphibious Cargo Carrier · · · · Wing Design Study · · · · Air Power-Steering

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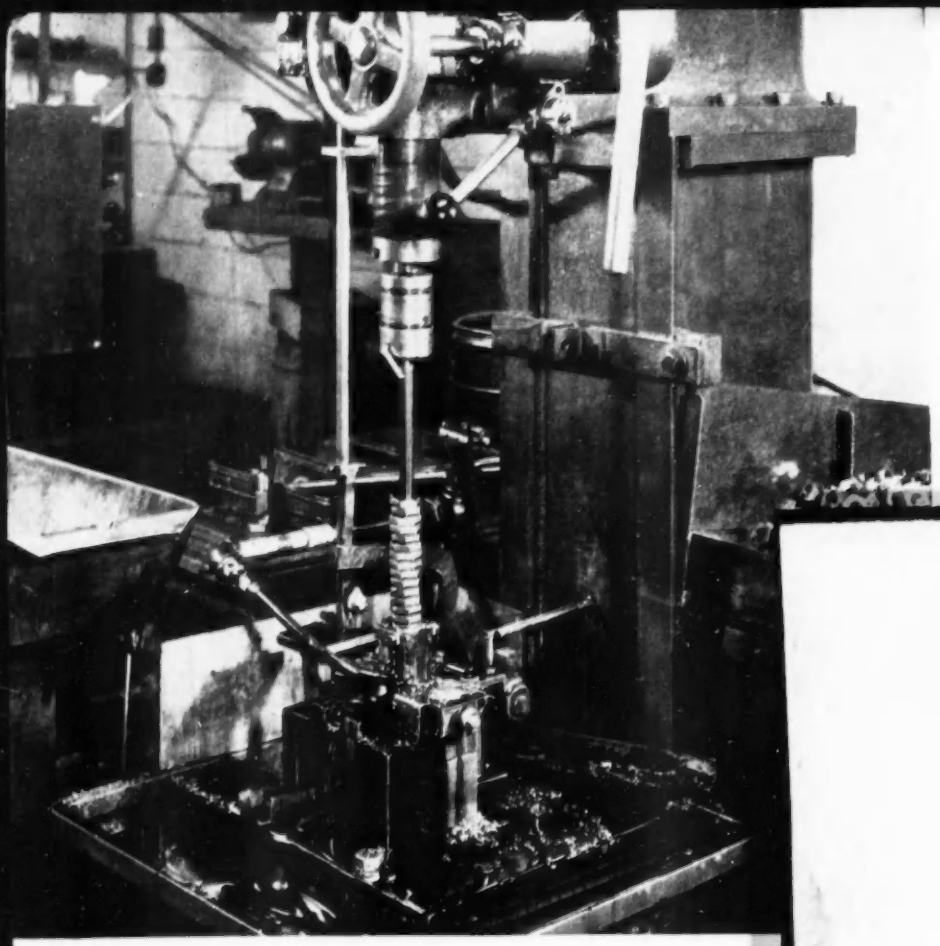


What's YOUR problem?

WAY

PAC

Tapping problem solved; production boos

● A midwest manufacturer was having trouble with a thread tapping operation. Performed on the drill press shown above, the job called for the tapping of a ¾-inch threaded hole in nuts made from C-1018 steel stock. The quality of threads tapped was poor. Rejections ran high because of torn threads.

Consulted on this problem, a Standard Oil lubrication specialist recommended the use of STANICUT Cutting Oil 309 BCS. Replacing a conventional cutting fluid, STANICUT turned the tide on troubles. With its use, quality of threads has been excellent. Rejections have been reduced to a minimum. Production has been boosted 25% — an increase of approximately 100 pieces per hour!

STANI
TRADE MA
Cutting Oil

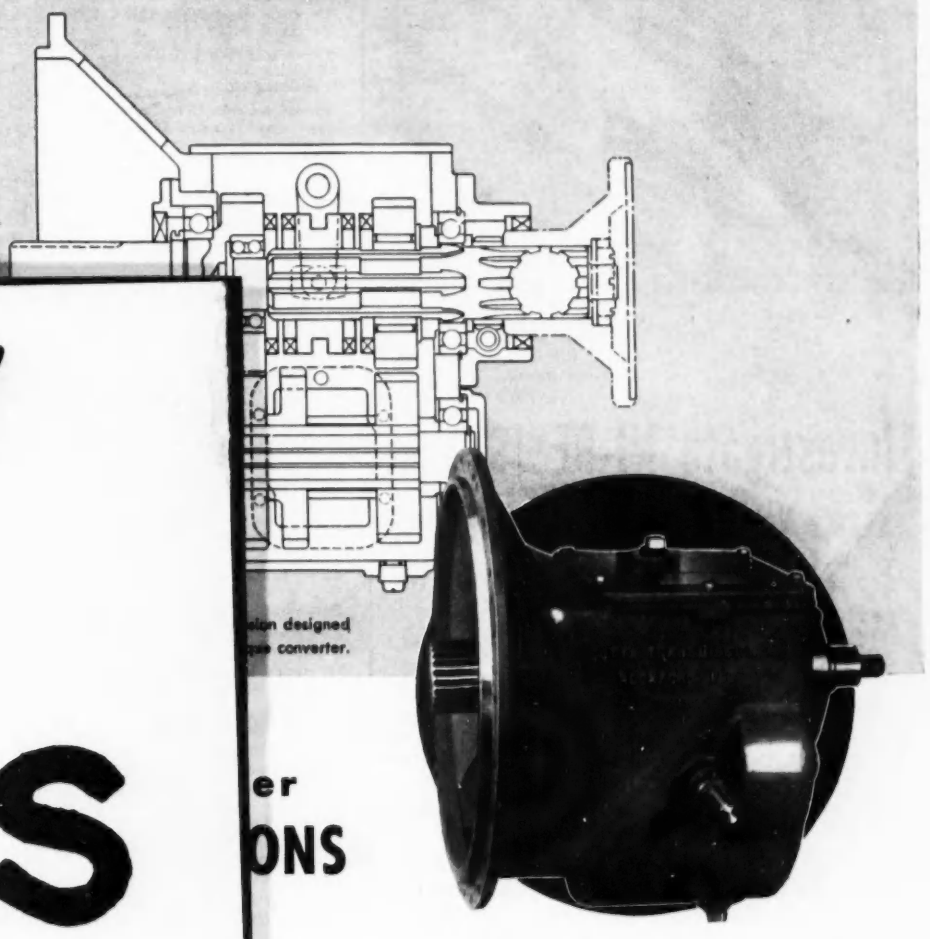
Whatever your cutting oil problem, the Standard Oil lubrication specialist in your section of the Midwest can help you solve it. You can contact him by phoning your local Standard Oil (Indiana) office. Or write: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

ter tool life and finer finishes than can be obtained with a conventional soluble oil.

STANOSTAMP COMPOUNDS — Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications. STANOSTAMPS offer maximum protection for dies and work. These compounds can be removed readily in conventional washing equipment.

STANDARD OIL COMPANY STANDARD *(Indiana)*

Deliver big power for big trucks through a wide range of torque conditions



...ion designed
...que converter.

...VY

...GES

...er
...ONS

...mission *built by Cotta* to serve the heavy-duty power requirements of big trucks.

Compact ... rugged ... easy to control ... it provides flow of power through a wide range of torque and speed conditions. At the same time, it has all the *special* heavy-duty features that are Cotta's specialty in the power transmission field!

Operators of railcars, winches, drilling rigs, trucks, hoists and other heavy-duty mobile equipment are enthusiastic about the ease of operation and increased efficiency of these compact mechanical drives.

If you are considering torque converters for your mobile equipment, and you need a special transmission that will stand up *under the long, hard pull* — come to Cotta!

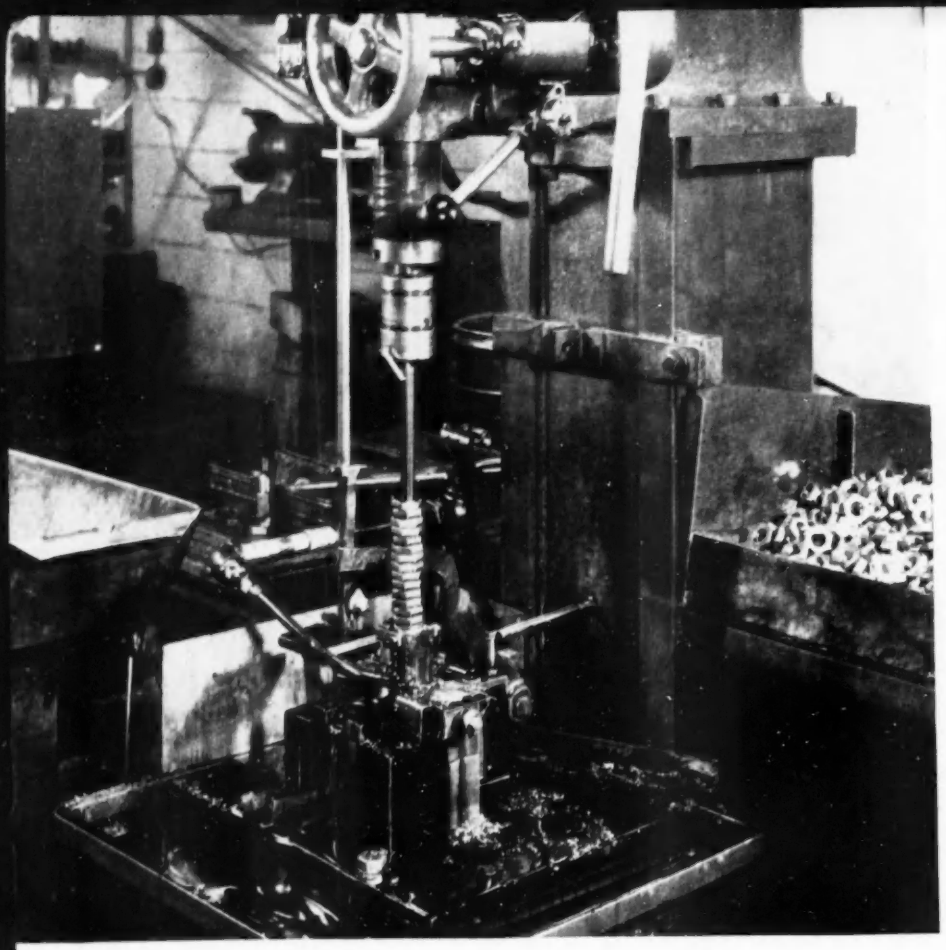
THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS

An Assurance of Dependable Service

COTTA
HEAVY-DUTY TRANSMISSIONS
"Engineered-to-order"



What's YOUR problem?

Dave F. Wallace of the Standard Oil office in Saginaw, Michigan, is the lubrication specialist who helped this midwest manufacturer solve a serious problem through the use of STANICUT Cutting Oil.

Like all Standard Oil lubrication specialists, he has a broad background of practical experience plus thorough training in Standard's own schools. And like all lubrication specialists, his on-the-job help is always available. He is one of a corps of experienced men who make their headquarters wherever industry is located throughout the Midwest.

For help with your problem, call for the services of your Standard Oil lubrication specialist today! A call to your local Standard Oil office is all that's necessary.

Tapping problem solved; production boosted 25%

● A midwest manufacturer was having trouble with a thread tapping operation. Performed on the drill press shown above, the job called for the tapping of a ¾-inch threaded hole in nuts made from C-1018 steel stock. The quality of threads tapped was poor. Rejections ran high because of torn threads.

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STANICUT
TRADE MARK
Cutting Oil

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STANICOOL HD SOLUBLE OIL — Because they contain additional compounding, these heavy-duty soluble oils possess not only the cooling ability of an emulsion but also the ability to give better tool life and finer finishes than can be obtained with a conventional soluble oil.

STANOSTAMP COMPOUNDS — Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical applications. STANOSTAMPS offer maximum protection for dies and work. These compounds can be removed readily in conventional washing equipment.

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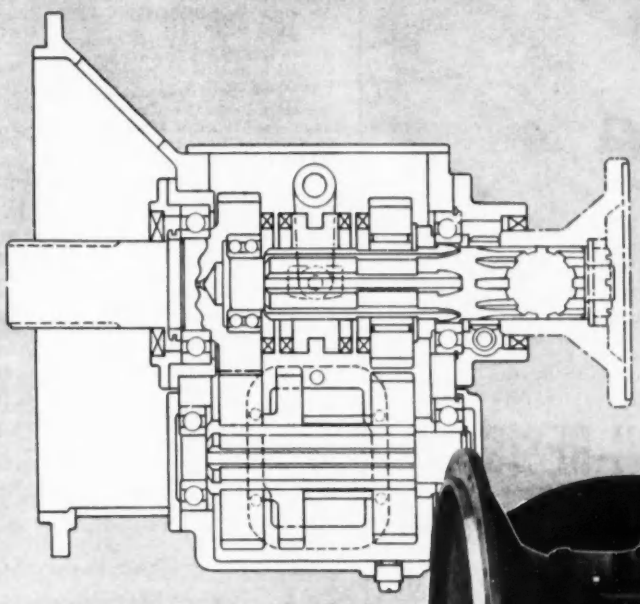

Power-packed Cotta Model TST Truck Transmission designed especially for reversing application behind torque converter.

with special Engineered-to-order

COTTA TRANSMISSIONS

Here's another special forward and reverse transmission *built by Cotta* to serve the heavy-duty power requirements of big trucks.

Compact . . . rugged . . . easy to control . . . it provides flow of power through a wide range of torque and speed conditions. At the same time, it has all the *special* heavy-duty features that are Cotta's specialty in the power transmission field!

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An Assurance of Dependable Service

COTTA

HEAVY-DUTY TRANSMISSIONS

"Engineered-to-order"

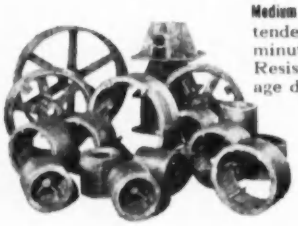
Light Castings . . . These piston rings are produced in Ni-Resist for engines used in corrosive service.

Investigate NI-RESIST . . .

No other cast metal provides such a unique combination of useful engineering properties

NI-RESIST® is available nationwide in 5 basic types to meet a variety of industrial demands: resistance to corrosion, heat and wear; strength and toughness; good machinability; high electrical resistance and non-magnetic characteristics . . . as well as heat conductivity and controlled thermal expansion.

At the present time, nickel is available for the production of Ni-Resist and other alloys containing nickel, for end uses in defense and defense supporting industries. The remainder of the supply is available for some civilian applications and governmental stockpiling.



Medium Castings . . . Free from tendencies to corrode, comminutor parts cast in Ni-Resist lengthen life of sewage disposal equipment.

Heavy Castings . . . Casing, outer column and discharge head of this 14-ton pump are cast in Ni-Resist for resistance to salt water and other corrosive media.

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Irvington, N. J.

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New York 17, N. Y.

American Brake Shoe Co.
Engineered Castings Division
10 Mt. Read Blvd.
Rochester 11, N. Y.

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Acco Casting Division
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Eddystone Division
Paschall P. O.
Philadelphia 42, Pa.

Barnett Foundry & Machine Co.
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Metals Processing Division
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Buffalo 11, N. Y.

Hunt-Spiller Manufacturing Corp.
383 Dorchester Avenue
South Boston 27, Massachusetts

Janney Cylinder Co.
7425 State Road
Philadelphia 36, Pa.

Koppers Company, Inc.
Metal Products Division
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Baltimore 3, Maryland

Kutztown Foundry & Machine Corp.
Kutztown, Pa.

Montague Machine Company
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Moline, Illinois

The Hamilton Foundry & Machine Co.
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Hamilton, Ohio

Kingsport Foundry & Mfg. Corp.
East Sullivan and Main Streets
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Michiana Products Corp.
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Michigan City, Indiana

Michigan Steel Casting Co.
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Detroit 7, Michigan

Moran Flexible Joint Co., Inc.
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Louisville 2, Kentucky

Reda Pump Co.
Bartlesville, Oklahoma

Ross-Meehan Foundries
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Chattanooga 1, Tennessee

St. Paul Foundry & Mfg. Co.
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St. Paul 3, Minnesota

Service Foundry Division
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Dover, Ohio

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The Sterling Foundry Co.
Wellington, Ohio

Texaloy Foundry Co.
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San Antonio 3, Texas

The W. S. Tyler Co.
3615 Superior Avenue
Cleveland 14, Ohio

Wells Manufacturing Co.
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Pacific Foundry Co., Ltd.
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Huntington Park, California

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A CHILTON MAGAZINE

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NBP National Business Publications, Inc.

ABC Audit Bureau of Circulations

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TOOL LIFE GREATLY INCREASED . . .

for Rockford Bolt and Steel Company, Rockford, Ill.

. . . since changing to TEXACO TRANSULTEX CUTTING OIL

Number 1018 Bright Basic Wire, 5/16" in diameter, is threaded at both ends with 18-pitch threads cut to a Class 2 fit. Threads are cut from 5/8" to 1-1/8" up from ends. Steel Hardness 165-210 Brinnel.

THE JOB: Cutting threads on studs with Landis Threader. (See box for details.)

THE CUTTING FLUID: *Texaco Transultex Cutting Oil* — the transparent cutting oil that does an outstanding job on heavy-duty work. Active sulfur and other extreme pressure additives, plus an effective wetting agent, assure fine cutting characteristics that give uniform performance even in prolonged heavy-duty service. *Texaco Transultex Cutting Oil* also has good odor characteristics.

THE RESULTS: Production is 650 to 700 ends per hour—a substantial increase over output with previous oil used. It is not unusual for threading dies to be ground only once a week.

Let a Texaco Lubrication Engineer show you how *Texaco Cutting, Grinding and Soluble Oils* can help you do *all* your machining better, faster and at lower cost. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

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are Free to Rotate in *BOTH* Directions!

Result:

Valves last many times longer. Performance records prove it!

Eaton Free-Valves are genuinely "free"—free to turn at random, in either direction, during a major portion of the lift-cycle.

This free-floating action wipes stem and seat free of deposits; keeps a film of oil on stem and guide surfaces. Scuffing is prevented, wear is reduced. Hot-spots due to local leakage are eliminated.

Eaton Free-Valves can be applied to practically any engine without design changes. Our engineers will be glad to discuss Eaton Free-Valves with you.

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SOLVING COMMON GASKET PROBLEMS

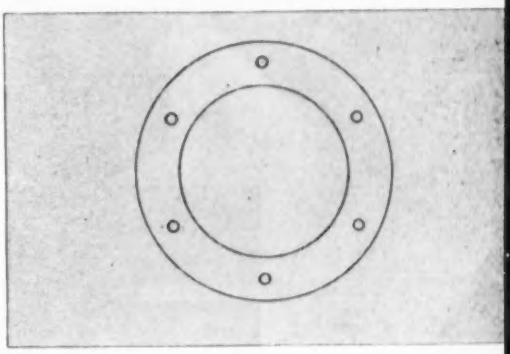
. . . with Accopac

Three interesting applications of Armstrong's new fiber gasket material

APPLICATION: Gear housing seal on helicopter

PROBLEM: Violent movement of the helicopter applied very high momentary loading on the gasket. Conventional fiber gaskets developed leaks and had to be replaced every 50 to 100 hours.

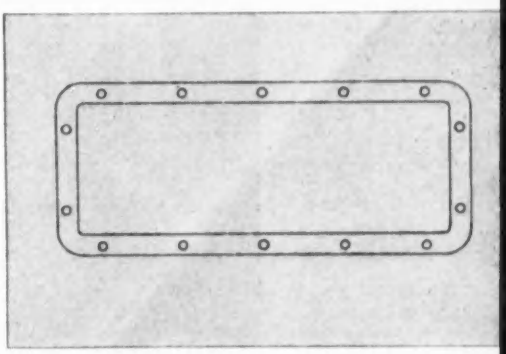
SOLUTION: This problem called for a tough gasket with high compressibility and great crush resistance. Accopac® was tried and found successful. Even under the extremely high pressures involved, Accopac gaskets lasted more than twice as long as those previously used—giving a tighter, more economical seal.



APPLICATION: Oil pan gasket on farm tractor

PROBLEM: The manufacturer had tried many different gasket materials to seal the oil pan of his tractors. However, no matter which type he tried he got oil leaks—and subsequent unsightly dirt accumulations on the engine block wherever it became wet with oil.

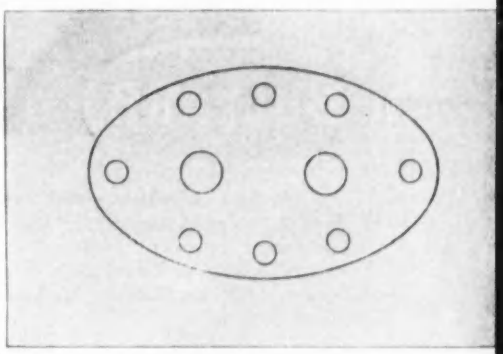
SOLUTION: Accopac was tried, and it proved completely satisfactory. In 2500-hour laboratory tests and in 3 months of field tests on tractors, Accopac gaskets didn't develop a single leak. As a result, there was no accumulation of oil to collect dirt. Accopac gave the tight, dependable seal that was needed for this particular application.

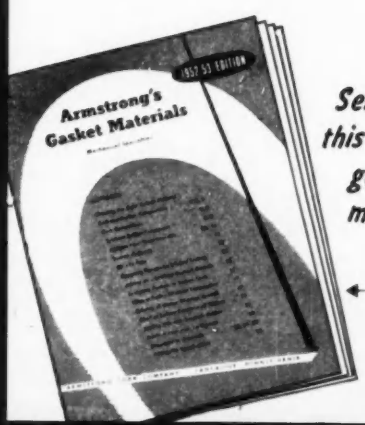


APPLICATION: Oil control valve cover gasket

PROBLEM: The glue-glycerine binder of conventional plant fiber gaskets attracted moisture from the air and helped corrode aluminum and steel components of the valve.

SOLUTION: $\frac{1}{32}$" Accopac now does the sealing job with no trace of corrosion. Accopac contains no corrosive agent, and its latex binder does not attract moisture. Neither can Accopac gaskets ever leak through drying out and cracking. The latex binder is non-volatile and non-extractable.





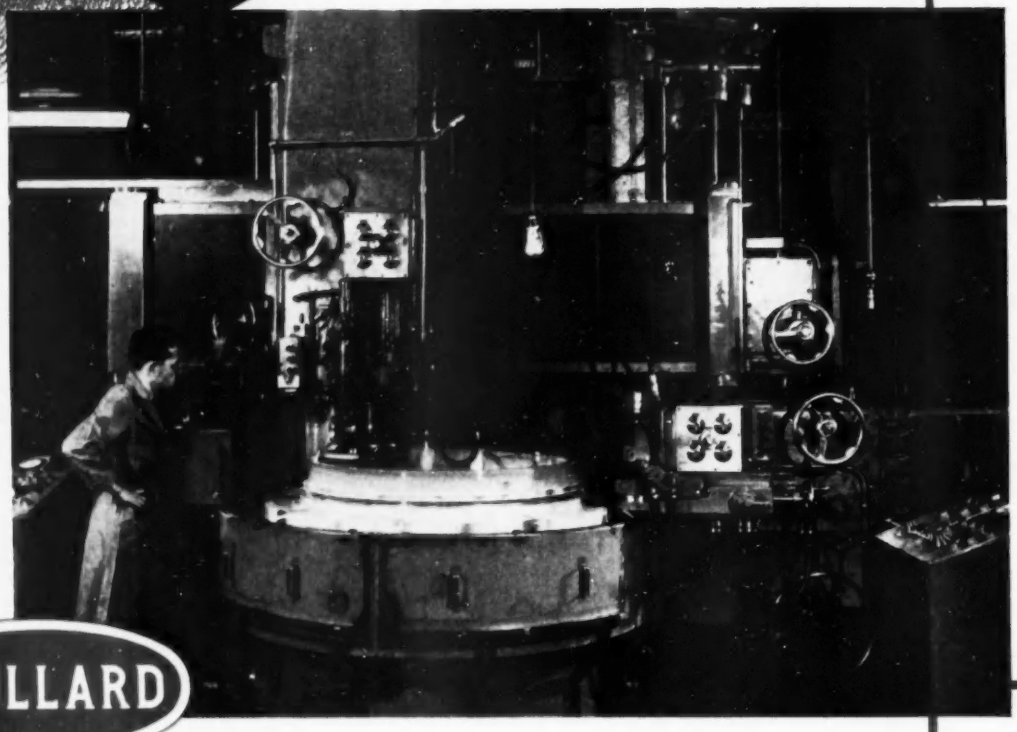
Send for this helpful gasket manual

If you have a tough sealing problem, investigate Accopac. It's a new kind of fiber gasket material, made by an improved beater-saturation process that locks each fiber in an even coat of rubber. This uniform composition gives Armstrong's Accopac its exceptional crush resistance.

Accopac also has unusual compressibility, dimensional stability, and imperviousness. Get your copy of Armstrong's 1953 Gasket Materials folder for complete facts on Accopac and other Armstrong's Gasket Materials. Call your nearest Armstrong Industrial Division office or write direct to Armstrong Cork Company, Gaskets and Packings Department, 5802 Arch Street, Lancaster, Pennsylvania.

ARMSTRONG'S ACCOPAC

NOW VERTICAL CHUCKING Grinders BY BULLARD



BULLARD

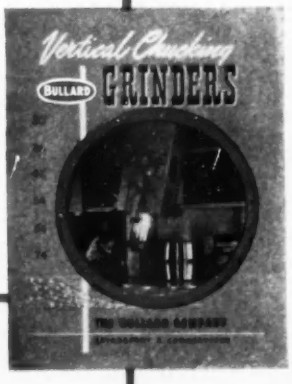
Bullard presents a carefully engineered and developed Vertical Chucking Grinding Machine in a range of sizes to meet present day requirements for conveniently grinding the larger sizes of work.

Years of study of field requirements for a truly accurate machine of this kind have produced this Vertical Chucking Grinding Machine now in production at the plant of TIMKEN BEARING CO. Canton, Ohio.

It is designed and built with Bullard characteristic Vertical Turret Lathe ruggedness and rigidity, combined with the sensitivity of control and built in precision so essential for successful grinding results.

Precision, flexibility of control, safety design and productive efficiency place THIS LINE OF VERTICAL CHUCKING GRINDING MACHINES as an IMPORTANT item on your list for immediate investigation.

Write now for Delivery dates and complete information, ask for VG-6S.



THE BULLARD COMPANY

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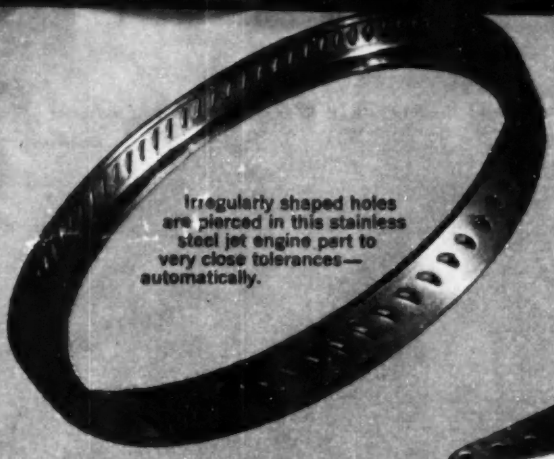
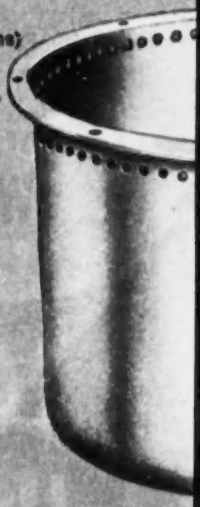


Irregularly shaped holes are pierced in this stainless steel jet engine part to very close tolerances—automatically.

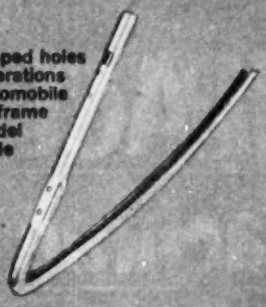
More than 40 holes in this automotive frame member are pierced simultaneously.



Cylindrical parts can be pierced (or related operations) from the outside in or inside out using an indexing type machine.

High Production Piercing...

IN A SINGLE SET-UP



Seven irregular shaped holes and two trimming operations complete this automobile door inner window frame in one setup. Model changes can be made at little expense.

Based on a recent development in piercing technique, you can pierce more holes simultaneously—faster and with greater accuracy—on Danly Metalworking Equipment. Eliminate awkward multiple handling . . . pierce all holes faster in a simple, single set-up.

Built specifically for your piece part, these are only a few of the advantages of Danly Hydraulic Metalworking Equipment:

Consider these important features!

- ***HIGH CAPACITY***—Up to 225 tons available per cylinder.
- ***BREAKTHROUGH SHOCK PRACTICALLY ELIMINATED***—Permits greater capacity without hydraulic circuit or tool trouble . . . smoother, faster.
- ***AUTOMATIC STRIPPING***—An integral feature of every cylinder . . . each station hydraulically strips its punch. This unique action simplifies fixturing, is practically foolproof.
- ***ACCURACY, FLEXIBILITY***—Pierces practically any type of hole . . . round, oblong or irregular to very close tolerances.

DANLY

DANLY MACHINE SPECIALTIES, INC.
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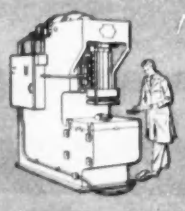
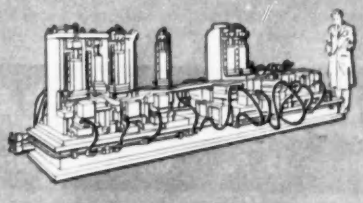
HYDRAULIC METALWORKING EQUIPMENT
MECHANICAL PRESSES / 50 TO 3000 TONS

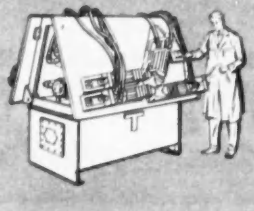
DANLY HYDRAULIC METALWORKING EQUIPMENT



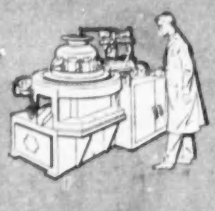
General Purpose Gap Frame Piercing Press



Automotive Frame Piercing Machine

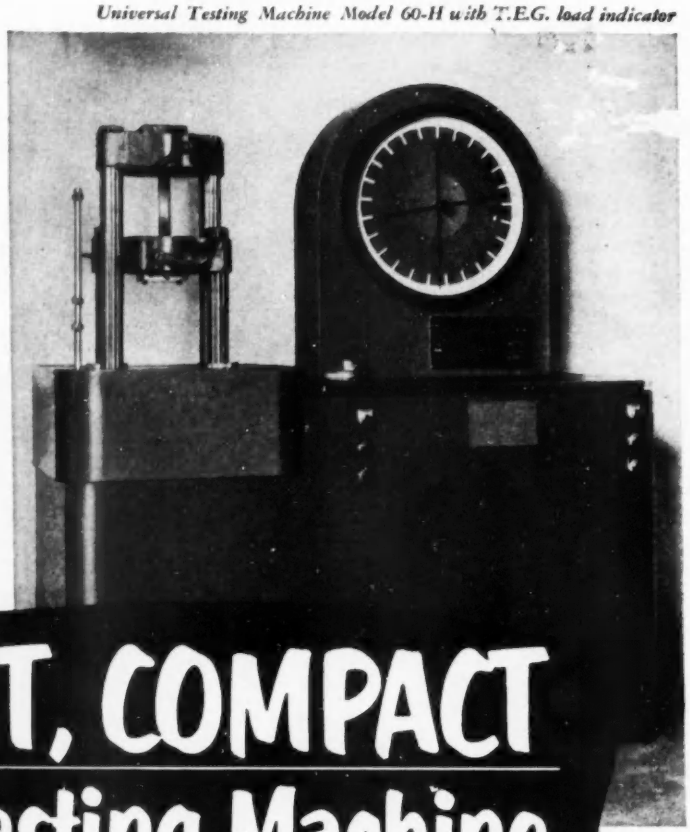


Automotive Inner Window Frame Piercing Machine



Jet Engine Shroud Ring Piercing Machine

Universal Testing Machine Model 60-H with T.E.G. load indicator



Now Baldwin Testing Headquarters Meets Your Needs With This New

LOW COST, COMPACT Universal Testing Machine

Recognizing your need for a low cost, faster and compact Universal Testing Machine, Baldwin-Lima-Hamilton Testing Headquarters developed Models 60-H and 12-H.

Quantity production makes possible fast deliveries and lower cost; nevertheless, the quality is so fine that its use in research laboratories is justified, particularly when equipped with the new T. E. G. load indicator.

With one of these new machines you would gain all of these advantages: (1) The first low cost machine which exceeds all minimum requirements for the routine testing job. (2) Faster, more rugged, more foolproof and able to stand more abuse than any comparable machine. (3) Operational damage prevented by simple safety devices. (4) One unit design with two unit features . . . will fit area only 67½" by 27"! Indicator housing supported independently to eliminate transmission of recoil. (5) Adjusting screws are completely enclosed in base and lubricated for life, eliminating worry and care. (6) Practically noiseless operation. Single knob control for loading and return.

For full information about the specifications and capabilities of this machine, write for our new Bulletin 4204 to: Dept. 2104, Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

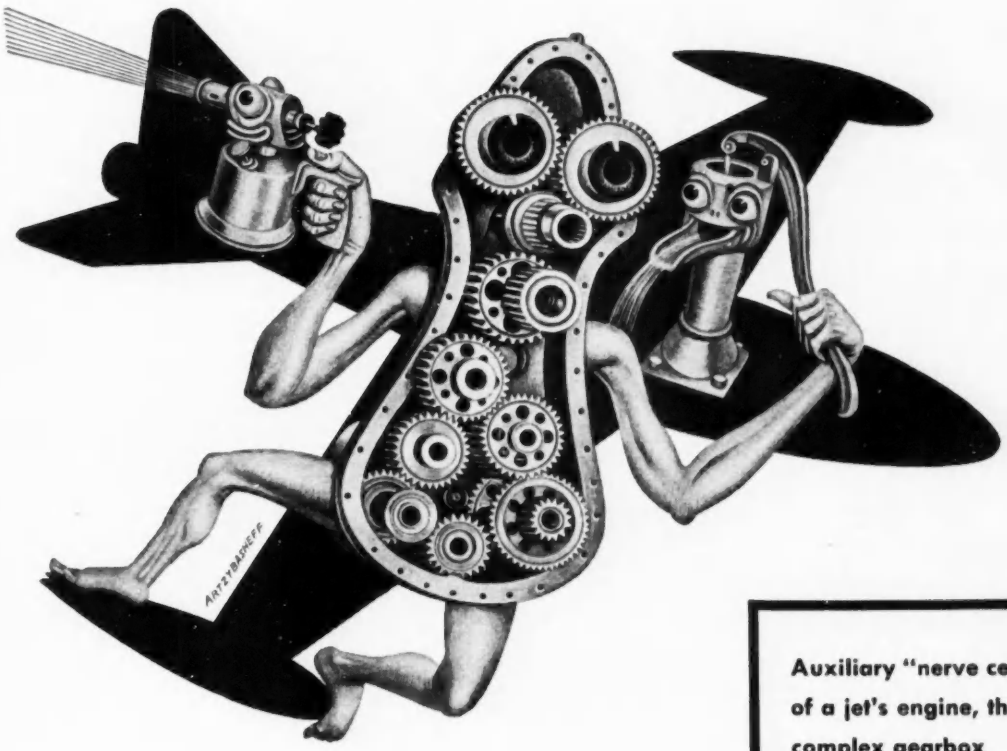
TESTING HEADQUARTERS

BALDWIN-LIMA-HAMILTON

General Offices: Philadelphia 42, Pa. • Offices in Principal Cities

In Canada: Peacock Brothers, Ltd., Montreal, Quebec

How a jet engine runs on its "nerves"



Auxiliary "nerve center" of a jet's engine, this complex gearbox transmits the power that runs oil and fuel pumps, generators, and other vital accessories.
To produce this intricate unit for J-40 engines, Westinghouse looks to Lycoming for precision production.

From a jet's mighty engine, these precision gears "take off" power and pass it along to vital accessory equipment *at the specific rate required by each different* unit. As many as 30 separate gears . . . as many as 2500 separate machining and assembly operations . . . go into this gearbox so essential to safe, efficient operation of a jet. And for this tremendously complex production, Westinghouse depends on Lycoming.

Lycoming stands ready to assist *you*, too. Whether you have "just an idea" that needs development, a problem in the blueprint stage, or a finished metal product that needs precise, speedy fabrication . . . you can depend on Lycoming's long-tested ability to meet the most exacting and diverse industrial or military requirements. *Whatever* your problem—look to Lycoming!

Lycoming's 2½ million feet of floor space, its more than 6,000 machine tools, and its wealth of creative engineering ability stand ready to serve your needs.

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LOOK TO **LYCOMING** FOR RESEARCH FOR PRECISION PRODUCTION

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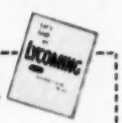
BRIDGEPORT-LYCOMING DIVISION, STRATFORD, CONN.
AVCO MANUFACTURING CORPORATION



Lycoming-Spencer Division
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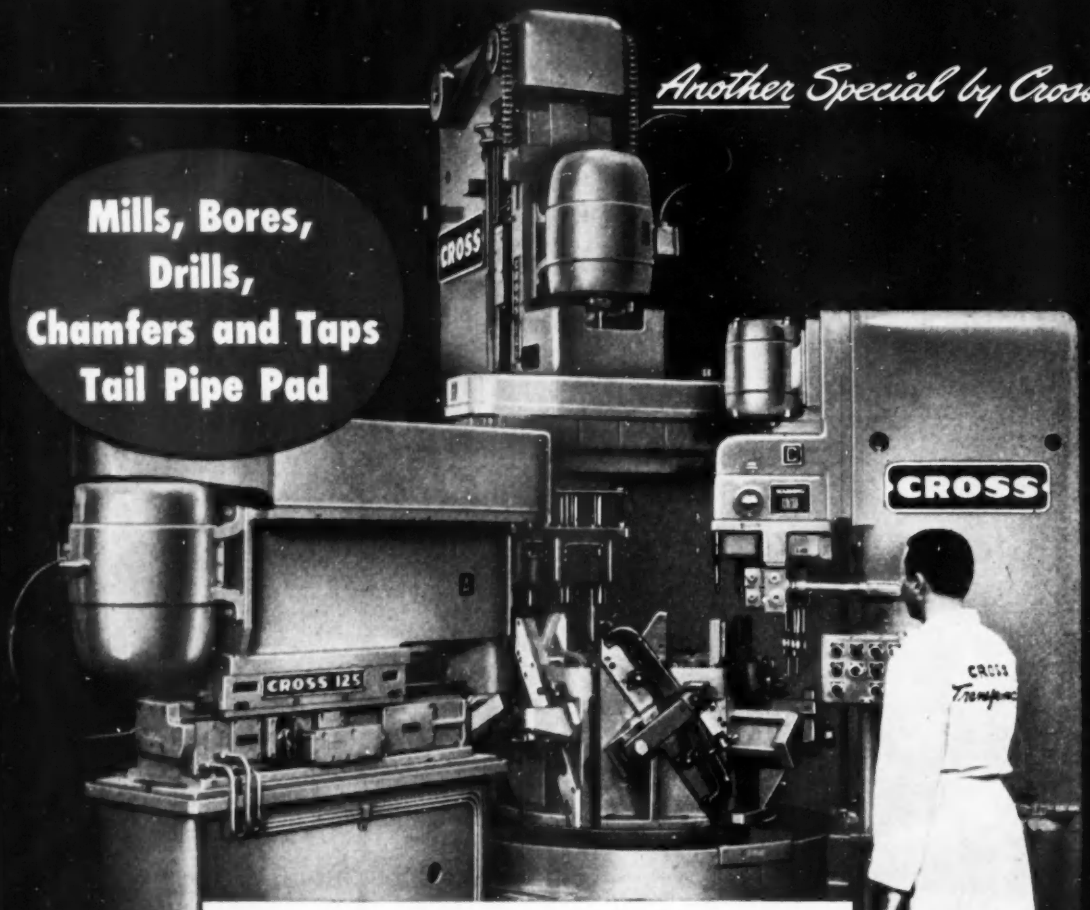


- ★ Mills, bores, drills, chamfers and taps tail pipe pad of exhaust manifold for six-cylinder engines.
- ★ 120 pieces per hour at 100% efficiency.
- ★ Six stations—one for loading and unloading and one each for milling, boring, drilling, chamfering, tapping.
- ★ Fluid motor-driven index table.
- ★ Construction to J.I.C. standards.
- ★ Other features: Hydraulic feed and rapid traverse; individual lead screw feed for tapping; hardened and ground ways; automatic lubrication.

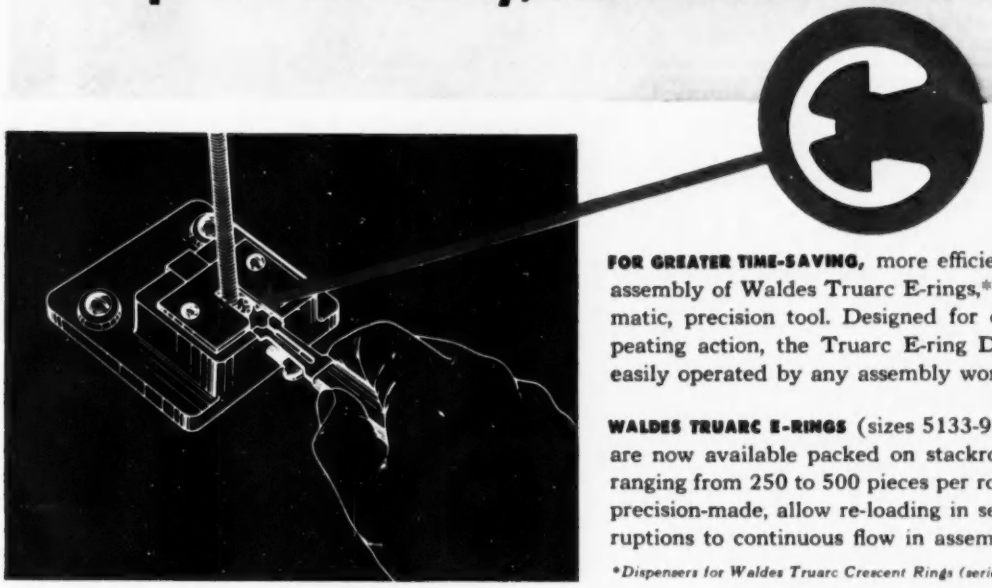
Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

New Waldes Truarc E-Ring Dispenser* Speeds Assembly, Cuts Time and Costs



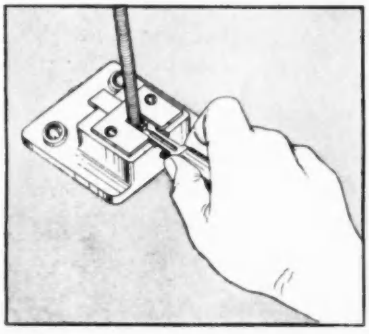
©U. S. PAT. PENDING

FOR GREATER TIME-SAVING, more efficient handling and assembly of Waldes Truarc E-rings,* here is an automatic, precision tool. Designed for one-at-a-time repeating action, the Truarc E-ring Dispenser can be easily operated by any assembly worker.

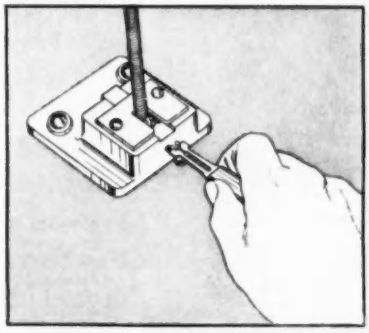
WALDES TRUARC E-RINGS (sizes 5133-9 to 50 inclusive) are now available packed on stackrods in quantities ranging from 250 to 500 pieces per rod. Stackrods are precision-made, allow re-loading in seconds. No interruptions to continuous flow in assembly.

**Dispensers for Waldes Truarc Crescent Rings (series 5103) also available.*

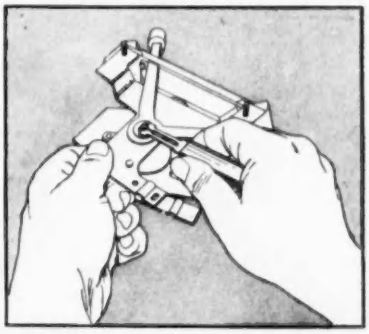
SIMPLE 1, 2, 3 ASSEMBLY OPERATION



■ Truarc applicator is pushed forward and grips a single E-ring.



■ Applicator withdrawn (new ring automatically feeds into place).



■ Ring is installed in groove on shaft. No waste time or motion.

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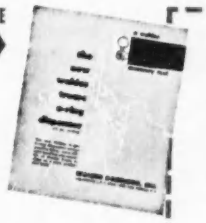

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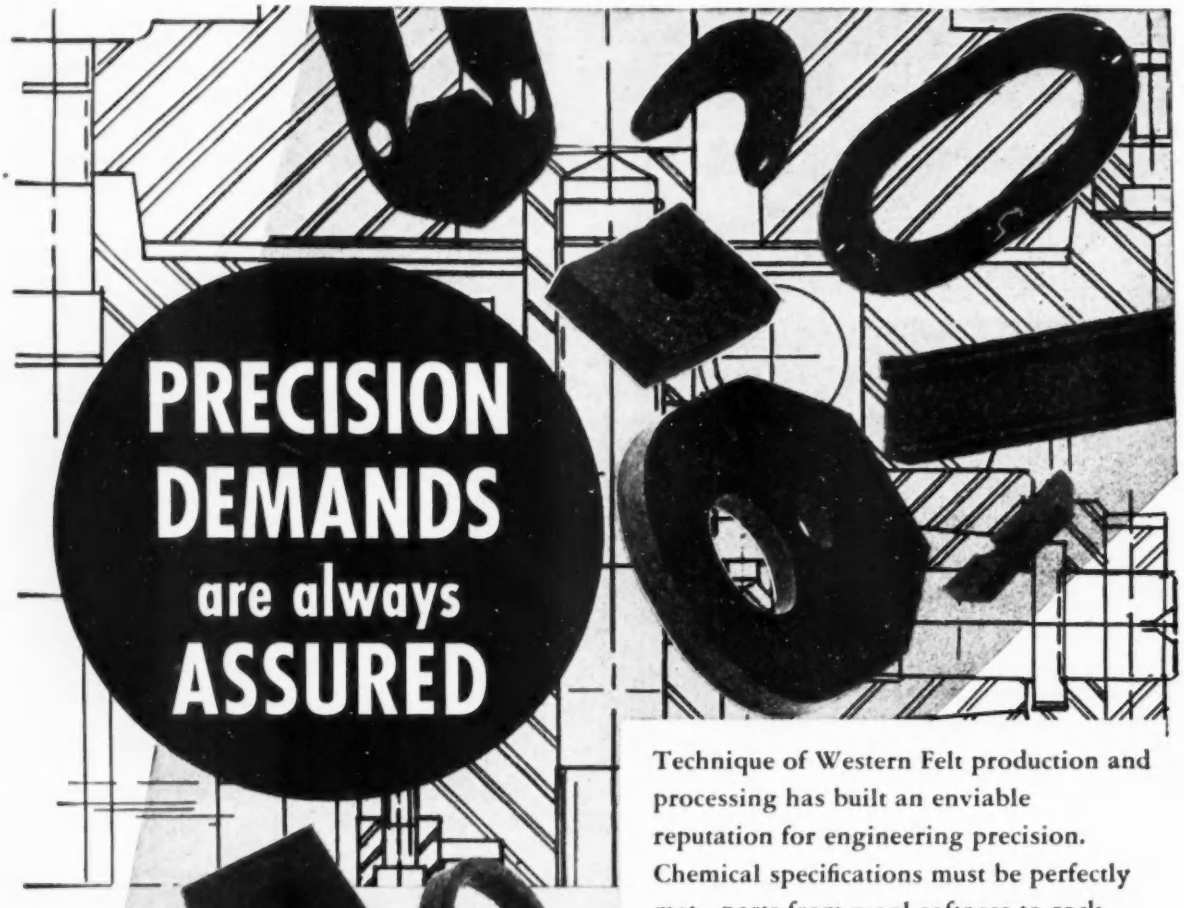

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For Testing ... For Production Line

If It's Low-Temperature Equipment

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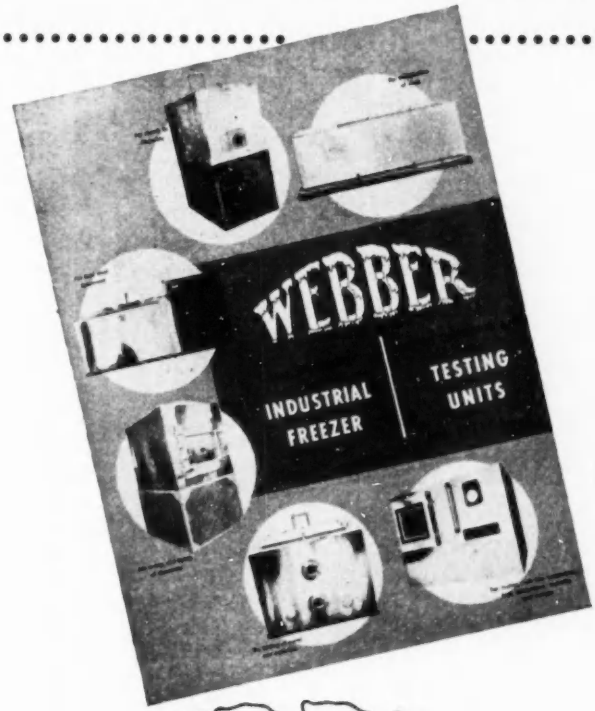

WEBBER manufactures to customer specifications . . . testing units and production line models at no increase in cost. Temperatures range as low as −185° F., and as high as 350° F., on heat cycle. Exclusive WEBBER patented features including stabilizing loops, reverse cycle refrigerating for heating which permits heat application under conditions that otherwise would become hazardous, and WEBBER patented heat exchangers are but a few of the factors responsible for such performance. Humidity and vacuum are offered for testing operations to stimulate atmospheric conditions found anywhere on earth . . . or above it.

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TESTING UNITS

LOW-TEMPERATURE

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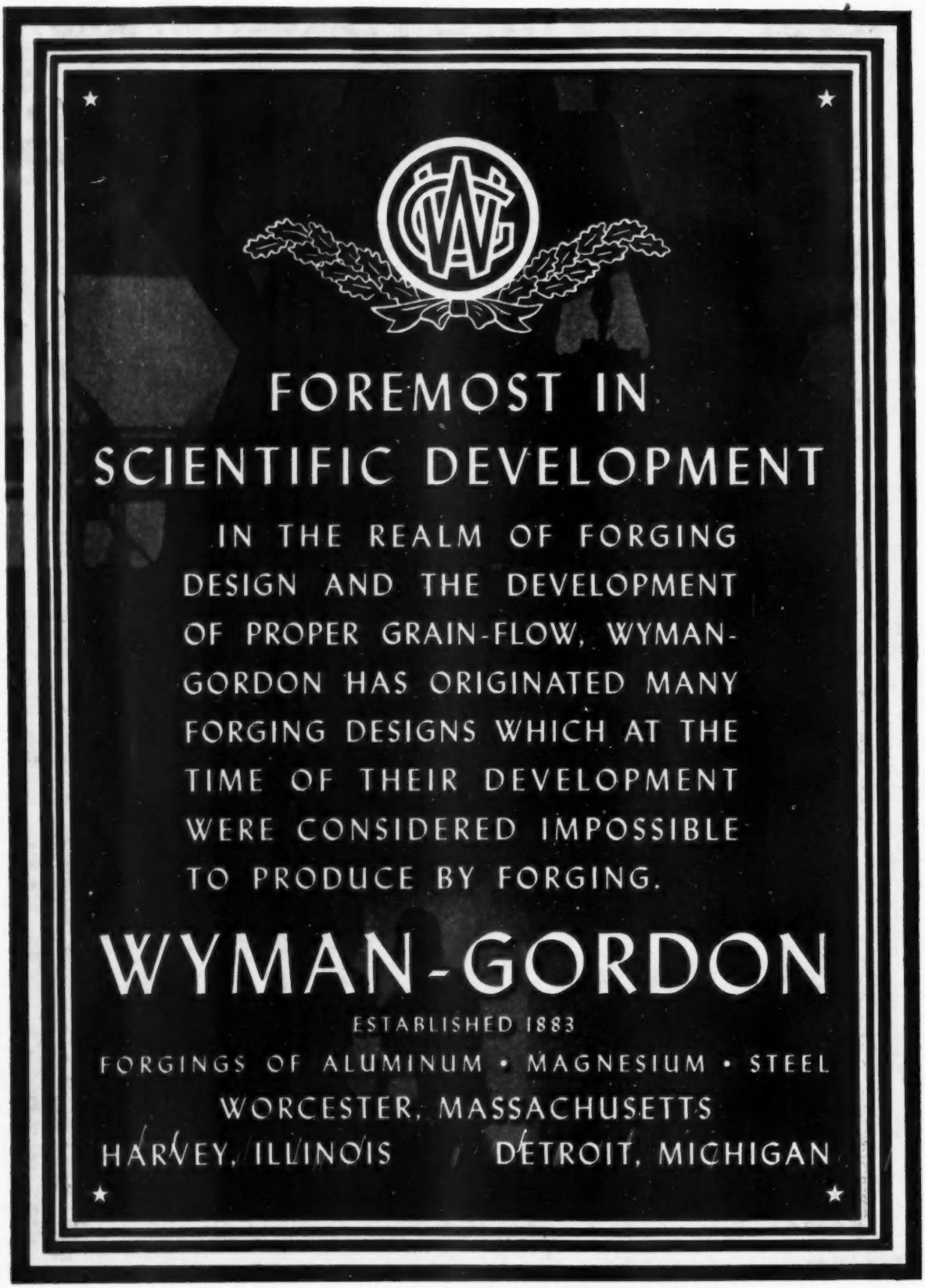
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SCIENTIFIC DEVELOPMENT
IN THE REALM OF FORGING DESIGN AND THE DEVELOPMENT OF PROPER GRAIN-FLOW, WYMAN-GORDON HAS ORIGINATED MANY FORGING DESIGNS WHICH AT THE TIME OF THEIR DEVELOPMENT WERE CONSIDERED IMPOSSIBLE TO PRODUCE BY FORGING.
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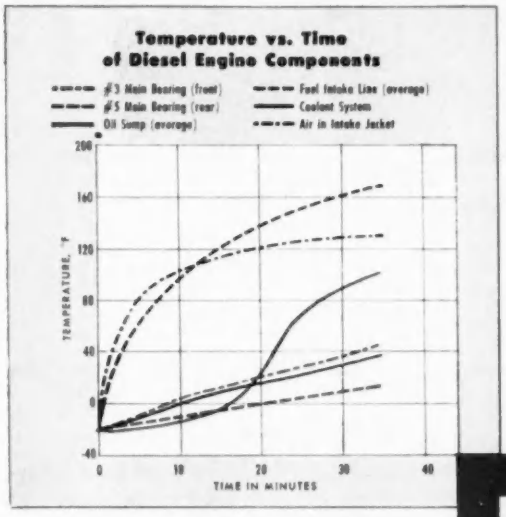
HEATING SYSTEMS
combine all these benefits in one heater!



FIGURES THAT PROVE SOUTH WIND'S SUPERIORITY

Lab Tested . . . Field Tested . . .
Best by Every Test!

South Wind's entirely new principle of scientific pre-heating has been developed, tested and proved in the field, as well as in the Stewart-Warner Laboratory Cold Room.

Here is a typical temperature record of critical engine components during pre-heating (only minimum capacity 70,000 BTU/hr. pre-heater kit used). This heat provided adequate temperature rise for easy starting—with less than 5 seconds' cranking.

Data is based on a 6-cylinder, 2-cycle, 225 HP Diesel engine weighing 3,000 pounds.

Engine Pre-Heating

Answers needs of all types of engines, all pre-heating requirements. Floods engine components, battery, crankcase, carburetor with warm, heated air. Makes starting easier, faster—*even at 65° below!*

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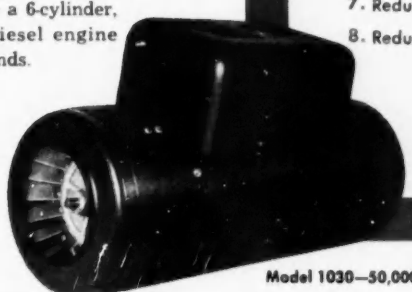
Warm air—independent of engine heat, independent of engine operation—circulates swiftly, evenly, to keep personnel comfortable at all times.

Windshield Defrosting

Keeps windshield reliably "frost-free." Assures clear vision, safer driving.

Compact, powerful, dependable Stewart-Warner "South Wind" pre-heating systems are first choice of engineers and maintenance men for these reasons:

1. Provides quick starting required by Military Services—even at 65° below.
2. One heater provides engine starting, cab heating and defrosting.
3. Provides only clean, *dry* hot air to engine.
4. Permits use of optimum viscosity lubricants.
5. Normal lubrication at all times.
6. Lowers engine maintenance cost—prolongs engine life.
7. Reduces battery drain by reducing starting torque.
8. Reduces cost of starting aids.
9. Eliminates shock loads imposed by brute force starting methods.
10. Inhibits sludge formation and freeze-up of engine accessories.



Model 1030—50,000 BTU/hr. output.

South Wind
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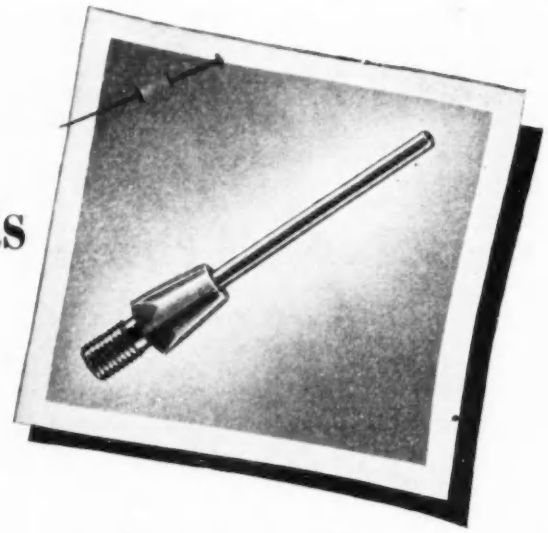
PERSONNEL HEATING
ENGINE AND
EQUIPMENT PRE-HEATING
WINDSHIELD DEFROSTING

A PRODUCT OF SW STEWART-WARNER

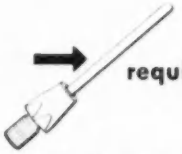
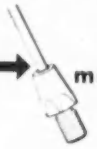
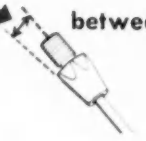
There's a South Wind Heater for every Pre-Heating need

Do You Have A Heating Problem? Write today for the experienced counsel of South Wind field engineers about any problem in external or internal pre-heating. The wide range of South Wind Heaters includes 20,000 – 30,000 – 50,000 – 100,000 – 200,000 and 600,000 BTU/hr. capacities. Write South Wind Division, Stewart-Warner Corporation, Indianapolis 7, Indiana.

To Reduce Your Contact Assembly Costs



Use the same specialized experience that solved this problem . . .

This tungsten electrode  requires grinding to a tolerance of ±.00025 of an inch to insure absolute concentricity. This braze  must withstand the centrifugal forces of the highspeed generator in which it is mounted. The hole in the chuck is held to a tolerance of ±.00025 of an inch. This angle  between the chuck and electrode is held to within ±6 minutes of a degree.

Originally Mallory produced only the tungsten electrode for this assembly. Another firm manufactured the chuck, and a third did the brazing and chrome plating . . . a complicated, costly process. Now, Mallory produces the entire assembly. The customer's problems of quality control, sub-contracting and divided responsibility are entirely eliminated . . . and his costs are lower.

This is just one more example of how many manufacturers have improved the performance and lowered the cost of contact assemblies by having Mallory do the entire job. No matter what your requirements are, Mallory's specialized production facilities . . . experience in designing and mass-producing over 5000 different types of contacts . . . can turn out precision contact assemblies for you at lower cost.

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Electric Welded Steel Tubes

Hot and Cold Rolled Carbon Steel up to 1025 Carbon

Round
Square
Rectangular
Special Shapes

Diameters from ¼" O. D. to 4½" O. D.
Wall thicknesses from .025" to .187"

● If you require Electric Resistance-Welded Steel Tube, we suggest you get in touch with Revere at once. On many requirements, exceptional deliveries can be made. Investigate this source of supply.

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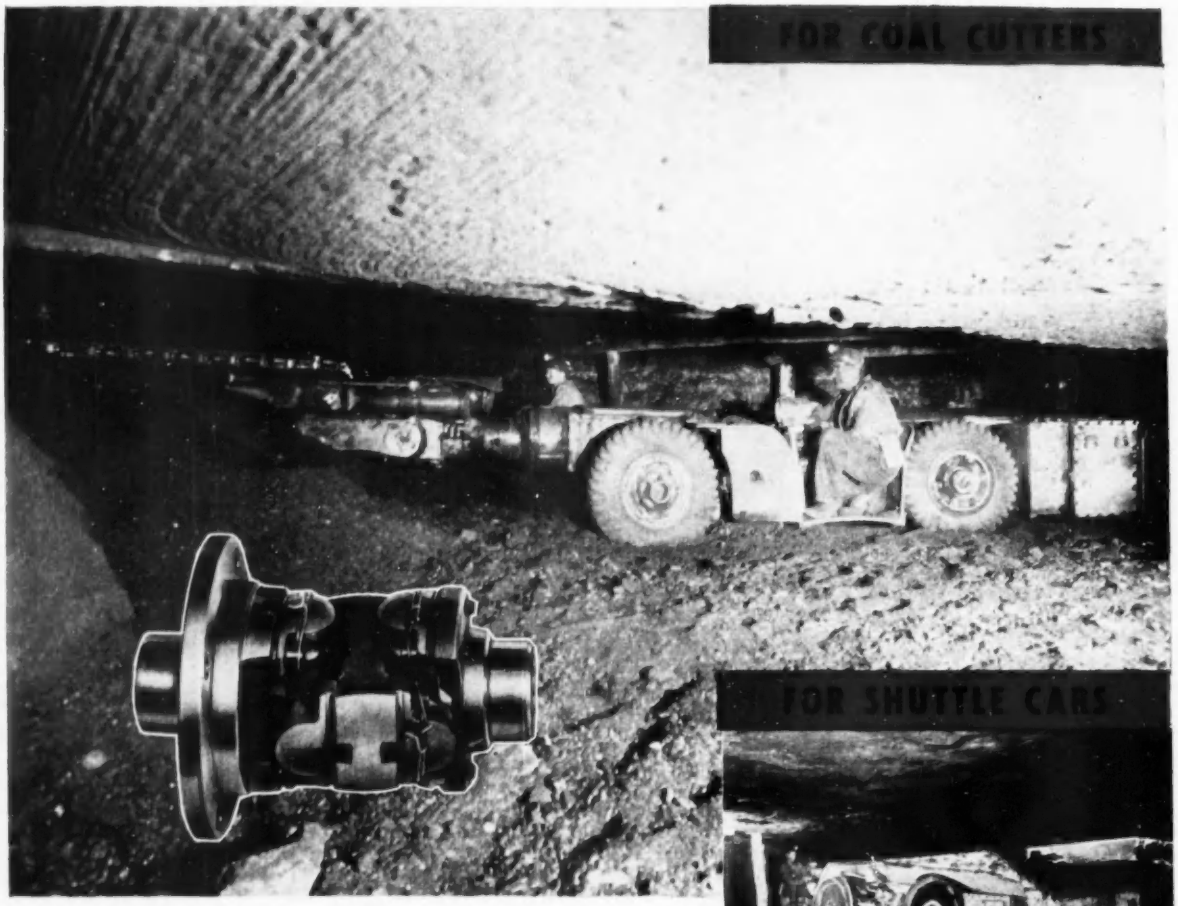

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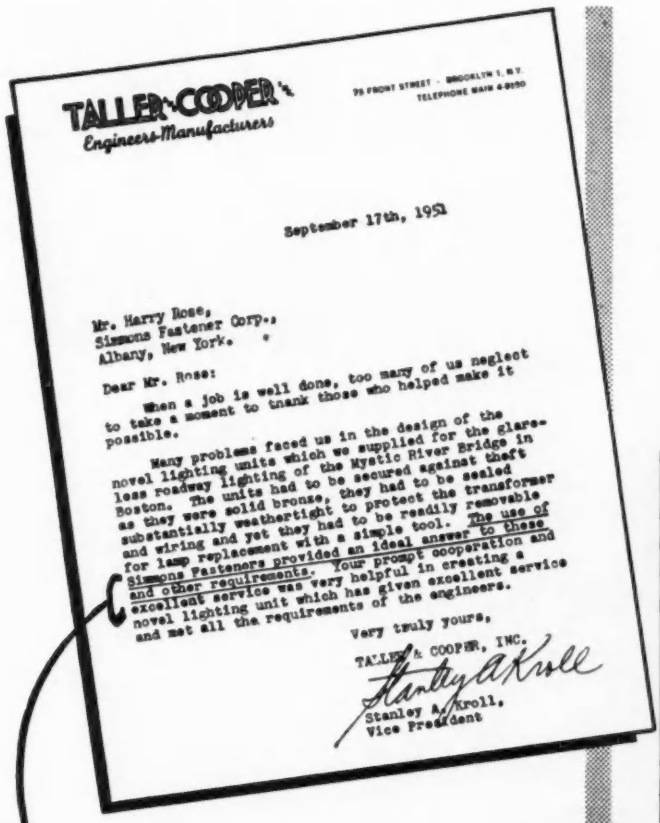


TALLER & COOPER, Inc.
Engineers-Manufacturers

75 FRONT STREET - BROOKLYN 1, N.Y.
TELEPHONE MAIN 4-9050

September 17th, 1951

Mr. Harry Rose,
Simmons Fastener Corp.,
Albany, New York.

Dear Mr. Rose:

When a job is well done, too many of us neglect to take a moment to thank those who helped make it possible.

Many problems faced us in the design of the novel lighting units which we supplied for the glareless roadway lighting of the Mystic River Bridge in Boston. The units had to be secured against theft as they were solid bronze, they had to be sealed substantially weathertight to protect the transformer and wiring and yet they had to be readily removable for lamp replacement with a simple tool. The use of Simmons Fasteners provided an ideal answer to these and other requirements. Your prompt cooperation and excellent service was very helpful in creating a novel lighting unit which has given excellent service and met all the requirements of the engineers.

Very truly yours,

TALLER & COOPER, INC.

Stanley A. Kroll

Stanley A. Kroll,
Vice President

"The use of Simmons Fasteners provided an ideal answer"

Getting the *right* answer—engineering and production-wise—is the day-by-day business of Taller & Cooper, Inc. This engineering and manufacturing company has produced many unusual designs for power control, wind tunnels, computers, automatic weighing and toll-bridge structures. Taller & Cooper engineers, in developing the sealed-beam lighting for the Mystic River Bridge, Boston, Mass., found the right answer in Simmons QUICK-LOCK.

Have you a similar fastening problem?

Unusual design by Taller & Cooper solves a number of problems in highway lighting. The engineers use a conventional sealed-beam headlamp mounted in an adjustable bracket. A cast bronze cover plate with integral visor is attached with three Simmons QUICK-LOCK fasteners to the housing which is part of the bridge structure. A rubber gasket seals the assembly.

Servicing is simple because QUICK-LOCK opens or locks with a 90-deg. turn. Inspection is easy because the stud is self-ejecting when it isn't locked. QUICK-LOCK keeps the gasket compressed tightly. The special head makes the unit tamper-proof. The fastener also resists vibration.

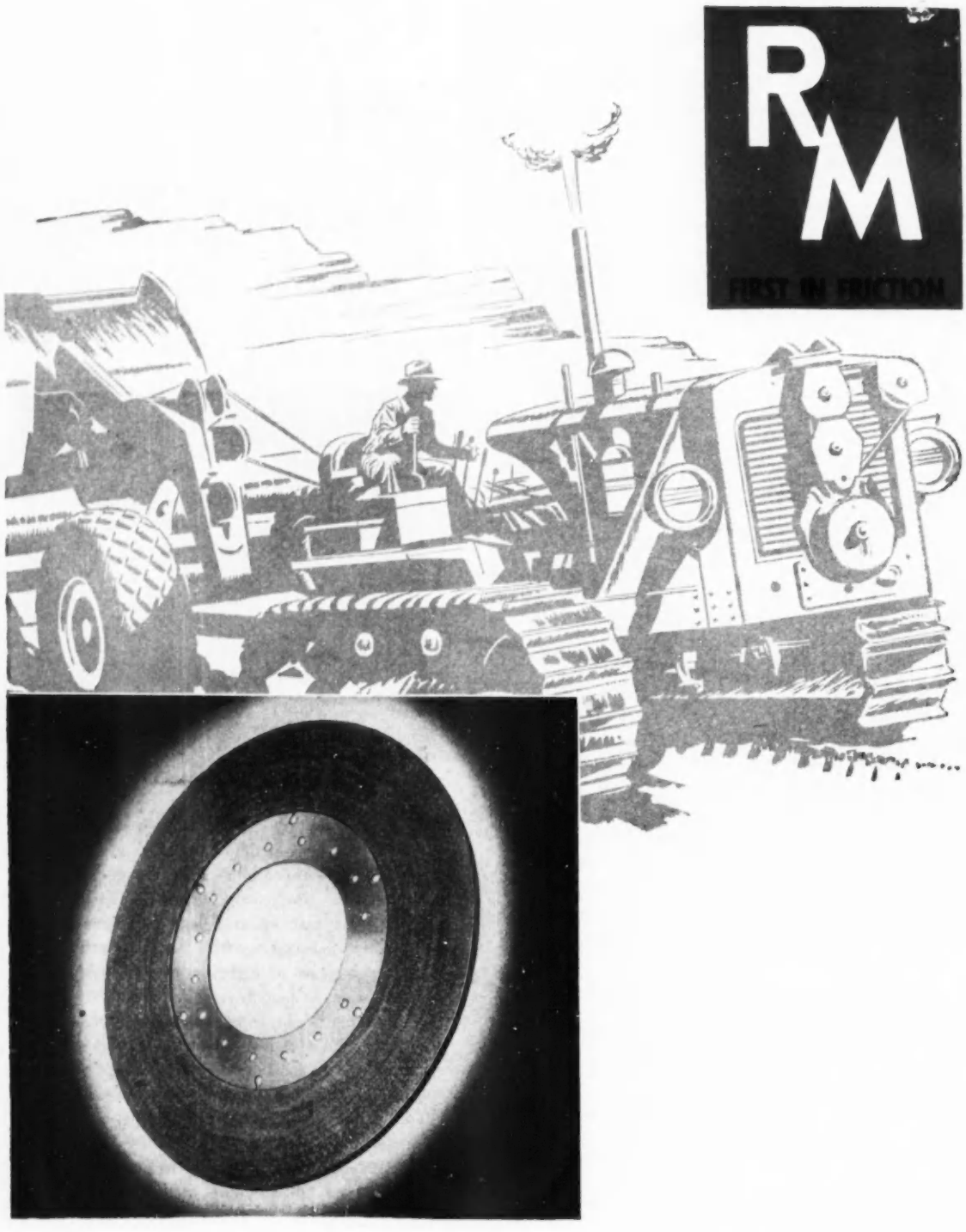
QUICK-LOCK can provide your design with unusual plusses, too. Simmons' engineers will be glad to study your fastening problems.

SIMMONS FASTENER CORPORATION
1749 North Broadway, Albany 1, New York

Simmons

LINK-LOCK . . . QUICK-LOCK . . . SPRING-LOCK . . . ROTO-LOCK

FASTENERS WITH USES UNLIMITED



In this crawler tractor, shifting is virtually eliminated by the hydraulic torque converter drive . . . and in this drive, a clutch plate assembly by Raybestos-Manhattan provides a vital link. Two 17" diameter R/M Vee-Lok® woven asbestos clutch facings bonded to a steel core provide smooth power flow through the entire range of operation . . . and with great durability. These facings help the tractor operate dependably under the toughest operating conditions, with drawbar pulls up to 65,000 pounds.

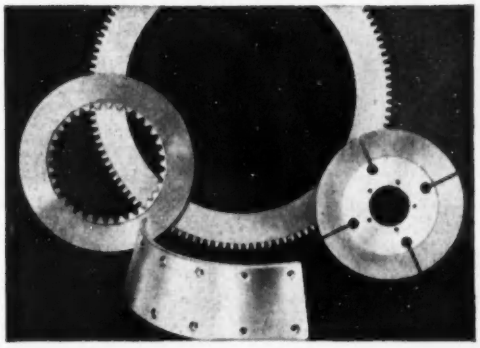
THE TRADE-MARK THAT SPELLS PROGRESS IN FRICTION MATERIAL DEVELOPMENT!

Advances in the field of friction materials for earth-moving equipment are but one phase of the continuing progress being made at Raybestos-Manhattan laboratories!

Similar advances in other fields are taking place all the time, through cooperation of design engineers and R/M research. This is true of the construction equipment industry, the mining machinery industry, the automotive industry, the office equipment industry, and many others.

To serve these many industries, R/M uses countless combinations of different types of friction material . . . including woven and molded asbestos, semimetallic materials, and sintered metal parts. Several of the newest developments in this important field stem from R/M's continuing research in powder metallurgy.

Whatever *your* friction material problem, your R/M representative is ready to help. He can work from samples, from designs on paper, from figures on horsepower developed combined with desired performance characteristics. Behind him stand all the facilities of the world's largest maker of friction materials . . . with six great plants, their research departments, and their testing laboratories.



Sintered metal parts are being used more and more in applications that require close tolerances, plus exceptional adaptability to working conditions such as operation in oil. Production capacity for R/M sintered metal parts is now greater than ever.

Write for Engineering Bulletin illustrating examples of R/M friction materials, for the aviation, agricultural and automotive industries . . . among others

RAYBESTOS-MANHATTAN, INC.

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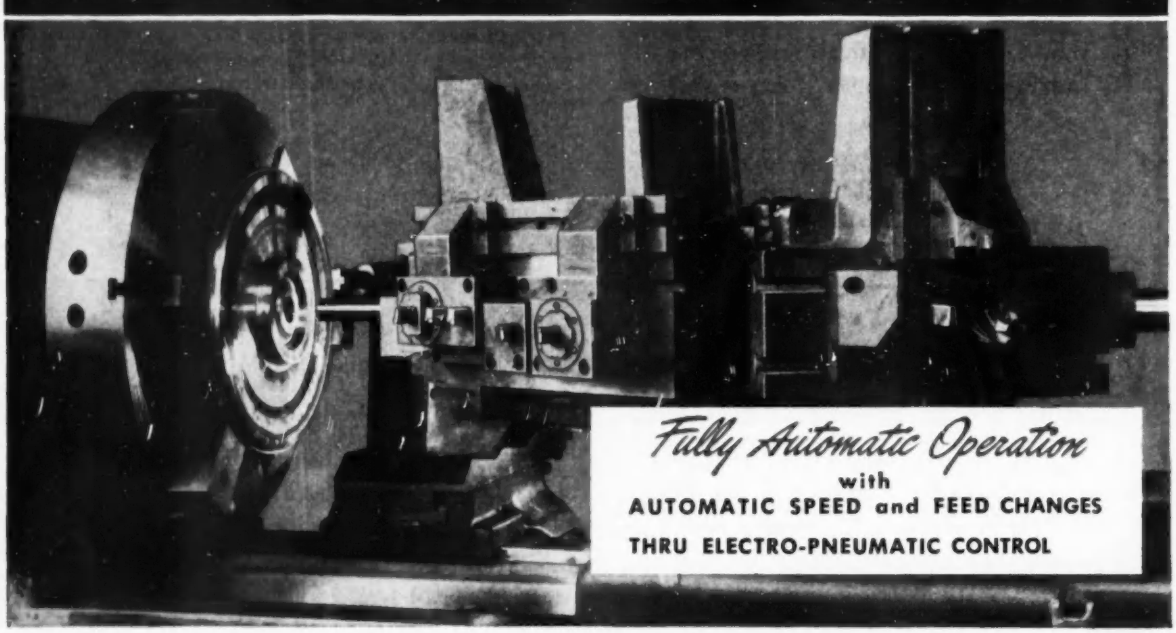
RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings Fan Belts • Radiator Hose • Industrial Rubber Products • Rubber Covered Equipment • Packings • Teflon Products • Asbestos Textiles • Sintered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

R M
FIRST IN FRICTION

HANDLE YOUR BIG JOBS WITH NEW *SPEED* AND *ECONOMY* ON THE POTTER & JOHNSTON 10-U

AUTOMATIC *Turret Lathe*



Fully Automatic Operation
with
AUTOMATIC SPEED and FEED CHANGES
THRU ELECTRO-PNEUMATIC CONTROL

New Productivity

in the manufacture of . . .

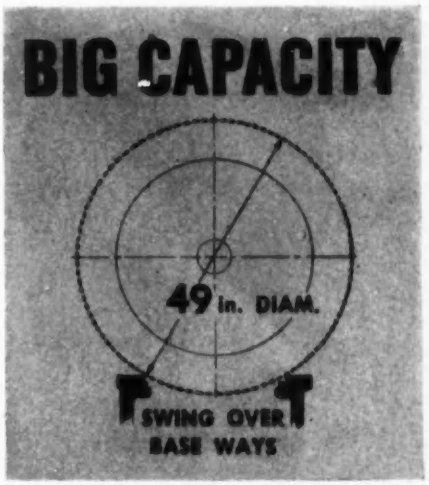
- AGRICULTURAL, EARTH MOVING AND AUTOMOTIVE EQUIPMENT
- AVIATION JET ENGINES
- BIG ELECTRICAL MOTORS
- ORDNANCE COMPONENTS

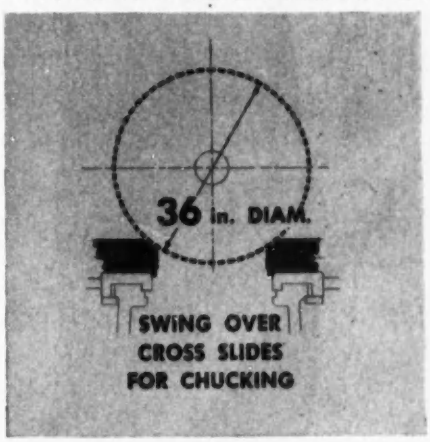
. . . AND ALL LARGE CHUCKING WORK

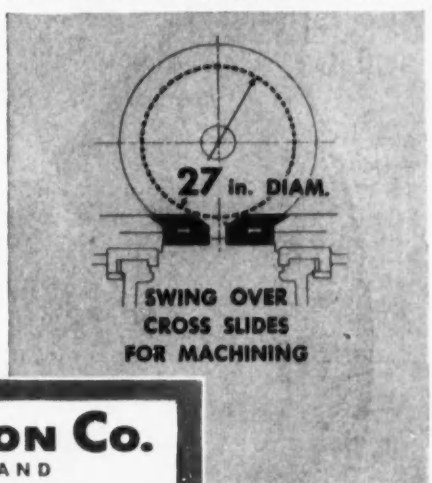
The big, powerful, new Potter & Johnston 10-U Turret Lathe now brings the advantages of fully automatic operation to your really big, hard-to-handle jobs, like this large-diameter disk for an aircraft jet engine—shown here mounted in a 36 inch chuck. The P&J-designed tooling takes full advantage of simultaneous multiple cuts to produce the finished work piece.

The P&J 10-U is equipped with a 75 horsepower motor, multi V-belt drive and air operated chucks. Controls are centralized in a single, convenient station. All mechanisms including the clutches are readily accessible for adjustment.

If you're doing big jobs, you'll want more information on the Potter & Johnston 10-U Automatic Turret Lathe. Send today for your copy of Bulletin 146. Write on your Company letterhead to the Pratt & Whitney Branch Office nearest you — or direct to Pawtucket, R. I.







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tiny to
giant-sized bearings

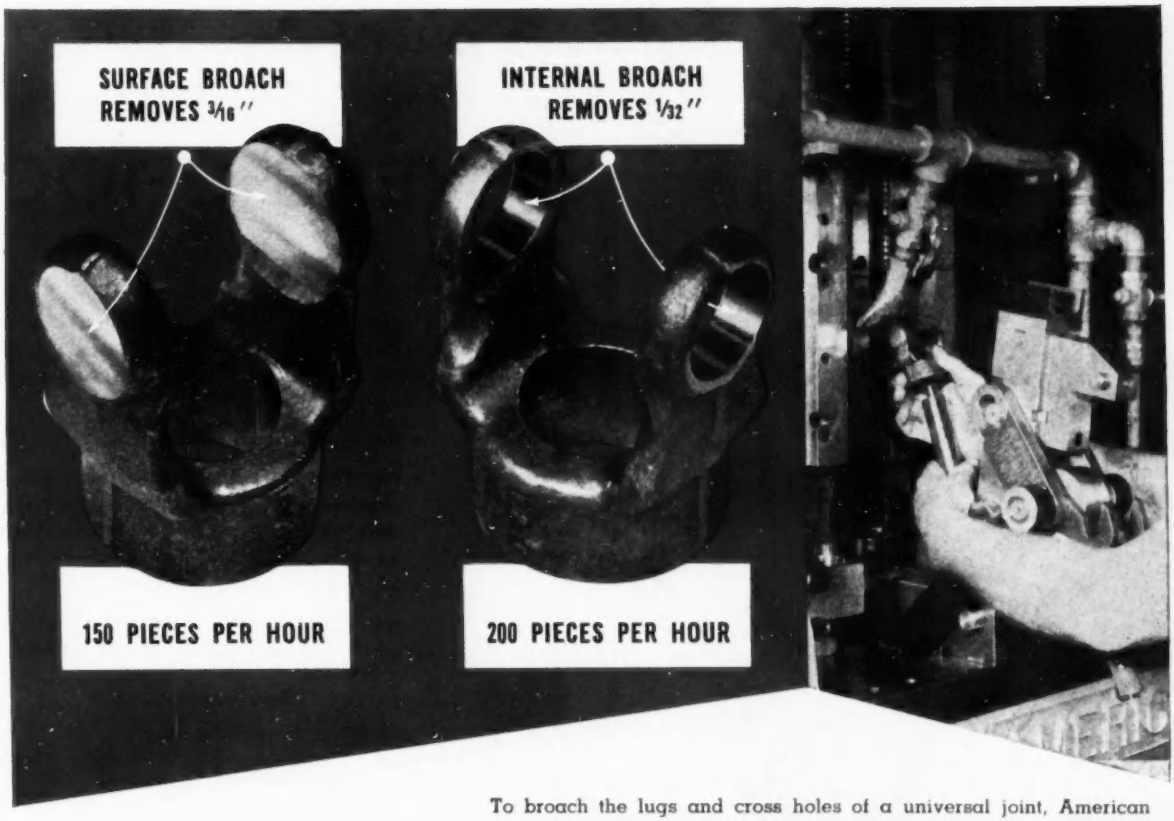
with TEAM-WORK built-in every size

With every size in SKF's wide range of ball and roller bearings, you receive an extra quality—*team-work.* This is the ability of SKF field and home office engineers to cooperate productively with your equipment designers. Helping to solve their bearing problems is the *extra* which all industries have learned to expect from SKF.

SKF
BALL AND ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILA. 32, PA. — *manufacturers of* SKF *and* HESS-BRIGHT *bearings.*

one American broaching machine



surface and internal broaching possible with American 3-way machine

To broach the lugs and cross holes of a universal joint, American engineers designed a combination tooling set-up on a standard American T-10-36 3-way machine.

Arranged with 3 stations, the machine surface broaches 3/16 stock off the inside and outside surfaces of the lugs at the center station; or broaches 1/32 off the I. D. of the lug cross holes at the two outer stations. The versatility of the American 3-way machine allows for a permanent tooling set-up, to handle both operations.

Such assistance in planning and setting up your broaching operation is part and parcel of the American Way of broach engineering. It is a typical example of the complete service you get from American Broach . . the organization that makes all three . . . broaches, machines, and fixtures.

For more information on your particular broaching problem send a part-print or sample and hourly requirements. Address Dept. I.

For more information on American Machines send for Catalog #300.

AMERICAN American BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
American Building - Ann Arbor, Michigan
See American First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

SUNDSTRAND

another reason why more threading shops say—

"we've standardized on VERS-O-TOOL"

You probably know Vers-o-tools as the self-opening, precision die heads that feature the circular-ground thread type of chaser—

- **the kind that give as many as 200 grinds.**
- **the kind that are micrometer gauge checked on their blocks before and after each grind, so that the first piece cut will be right—no removal of head, no fussing to get size, no scrap.**

Vers-o-tools are the most versatile tools, produce more per dollar of investment—cost less. That's why so many experienced users say, "We've standardized."

How about the shorter runs?
Simply substitute the Adjustable Blade Chasers and Blocks for circulars in the same Vers-o-tool head. They also have ground threads and the cost is less.

Hollow Milling?
End forming and turning cutters, both circular and blade-types, cut three times faster than single point tools, snap open and leave no marks, also knurls and burnishing rolls.

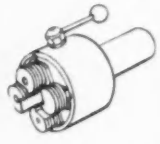
Interchangeable?
All chasers, mills or rolls, circular or blade-type, are, with their blocks, used in both revolving and non-revolving Vers-o-tools, die size for size.

DT-52 is the complete new catalog on Vers-o-tools and Namco Solid and Collapsible Taps.

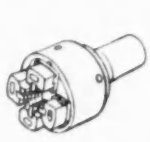
Time Saving ... that's it!

Change chasers in less than 2 minutes—just lift reset handle, slide back the hood and they drop out—no screws, no adjustments, patented.

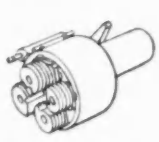
Time saving—that's it! . . . And that's one big reason why makers of smooth class 3 high pressure threads whose 'round-the-clock schedules often run into millions of a kind STANDARDIZE on Namco Vers-o-tools.



Style DS Vers-o-tool (Non-revolving Type) 10 Sizes, 3/8"—6 1/2".



Style DR Vers-o-tool (Revolving Type) 13 Sizes 3/16"—6 1/2" Shown with Adjustable Blade Chasers 7 Sizes, 1/8"—2".

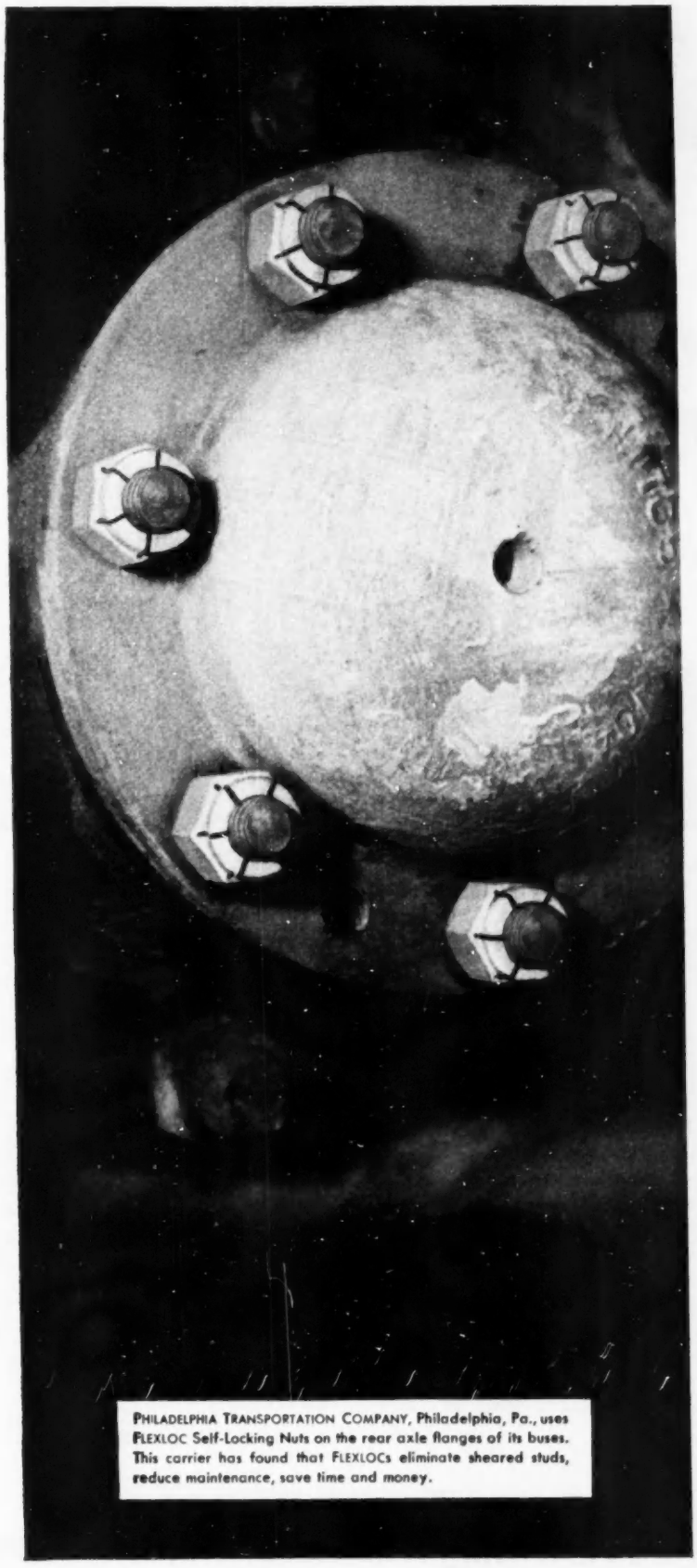


Style DBS Vers-o-tool (for B&S Automatics) 3 Sizes, 1/4"—3/8".

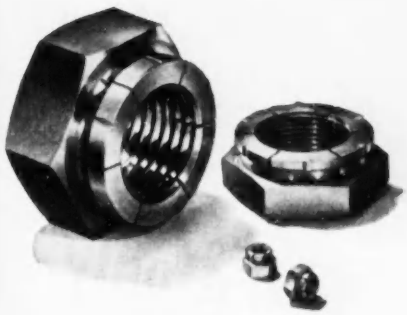
24-HOUR DELIVERIES ON MOST STANDARD STOCKABLE NC AND NF CHASERS AND BLOCKS—ALSO NATIONAL TAPER PIPE AND DRY SEAL

The NATIONAL ACME CO.
170 EAST 131 STREET, CLEVELAND 8, OHIO.

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing.



PHILADELPHIA TRANSPORTATION COMPANY, Philadelphia, Pa., uses FLEXLOC Self-Locking Nuts on the rear axle flanges of its buses. This carrier has found that FLEXLOCs eliminate sheared studs, reduce maintenance, save time and money.



How FLEXLOC locknuts work

FLEXLOCs lock and stay put on a threaded member regardless of the vibration encountered. Here's how they work. The slotted top or locking section is divided into six equal, flexible segments, closed in to make the inside diameter of the nut smaller than that of the companion bolt. When the FLEXLOC is applied, these are expanded by the bolt. The spring tension of the resilient segments locks the nut securely at any desired position on the bolt once the locking threads are fully engaged.

FLEXLOCs can be used over and over again. When expanded by the bolt, the locking section remains within the elastic limit of the metal. This permits the locking segments to return to their normal position, ready for reapplication to the bolt.

FLEXLOCs are one piece, all metal—nothing to assemble, come apart, lose or forget. They can be delivered in any quantity in a wide range of sizes. Stocks are carried by industrial distributors everywhere. Write for literature and samples. SPS, Jenkintown 53, Pa.

FLEXLOC®

LOCKNUT DIVISION

SPS

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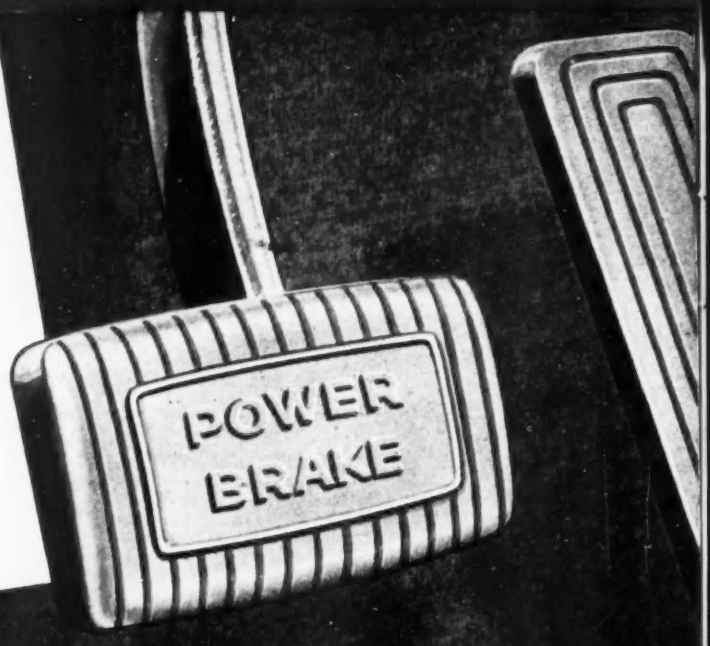
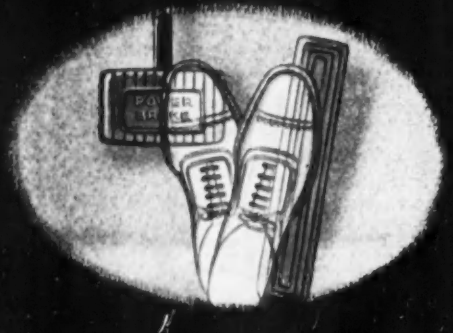
Our Fiftieth Year : A START FOR THE FUTURE

Bendix leads again...

the only performance proven LOW PEDAL power brake



NOW *Stopping* IS AS EASY AS *starting*



It is no longer necessary to lift the foot and exert leg power pressure to bring your car to a stop. With the Bendix Low Pedal Power Brake on about the same level as the accelerator, an easy ankle movement, much like working the accelerator is all the physical effort required for braking. And by merely pivoting the foot on the heel, shifts from "go" to "stop" controls are made in far less time.

Result: More driving comfort, less fatigue and greater safety.

The Greatest Improvement in Braking Since Four Wheel Brakes

One of the most popular new car features offered the public in years is the performance proven **low pedal power brake** engineered and manufactured by Bendix, the industry's leader in all types of braking.

The Bendix* low pedal power brake represents an entirely new conception of power braking designed specifically to meet the braking requirements of the industry's latest and finest vehicles.

This great advancement in braking is unique in many ways. It is, for example, the **only low pedal power brake** that has met the tests of millions of miles under all operating conditions. It has already won the overwhelming preference in its field with car manufacturers. And this low pedal power brake is the product of Bendix, the world's largest producer of power brakes and the originator of practically every important braking development since the earliest days of the automotive industry.

Passenger car manufacturers contemplating power braking should investigate the advantages of the Bendix low pedal power brake. *REG. U.S. PAT. OFF.

Bendix Products Division

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High Spots of This Issue

★ Outstanding Operations on Ford's New Tractor Engine

Parallel transfer machine lines, already proven so invaluable in passenger car production, are being used by Ford in the machining of cylinder blocks and heads for its tractor engine. Their various work cycles are detailed here. Page 48.

★ Spotlight on Plastic Cars at GM Motorama

A dazzling panorama of automotive splendor, GM's recent show in New York is particularly memorable for the special models sponsored by each passenger car division. Four of these were sports cars with unusual plastic bodies. See Page 52.

★ Buick's New Plant for Producing V-8 Engines

Located near Flint, Mich., Buick's new V-8 engine plant is an integral unit with 880,000 sq ft of space. While some tooling is yet to come, work has already started on Roadmaster and Super engines. Present equipment is described. Page 56.

★ Comparison of Wing Planforms for Supersonic Speeds

The choice of the proper wing planform in designing aircraft has always been a difficult and arbitrary problem. The author of this article attempts to clear up some of the confusion on this score and suggest sound solutions. Page 60.

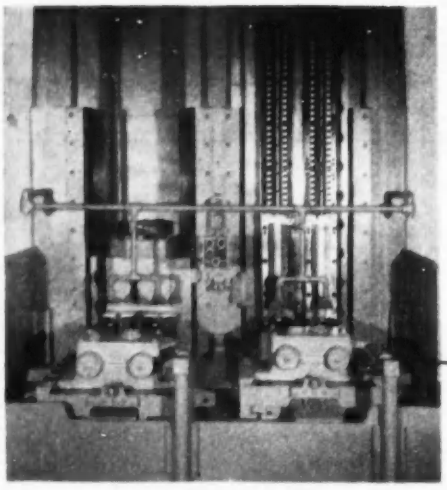
★ New Studebakers Feature Dashing Continental Lines

Styling in the Euopean manner has struck the Studebaker line for 1953 with full force. In summary, the cars are completely changed both inside and out. Mechanical-wise, the big news is an entirely different power steering system. Page 64.

★ 24 New Product Items And Other High Spots, Such As:

Pontiac's newest method for making front fenders; engine developments at National Boat Show; the amphibious Otter; specially tooled press saves time in assembling filters; air power steering; Air Force Research and Development Centers; automatic boring machine for jet engine components; and Army tank facts.

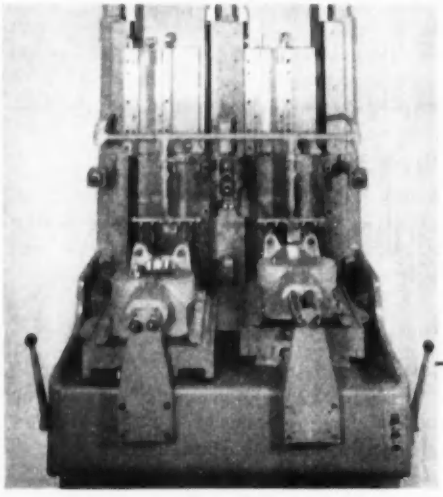
Automotive and Aviation News, Page 33
Complete Table of Contents, Page 3



JOINT FACE AND HALF BORE

Part name..... Connecting rod
Material..... Steel forging
Operation..... Broach joint face and half bore
Stock removal.... 3/16" max.
Production..... 518 per hour
Machine..... CINCINNATI No. 15-66 Duplex Vertical Hydro-Broach completely equipped by Cincinnati Application Engineers

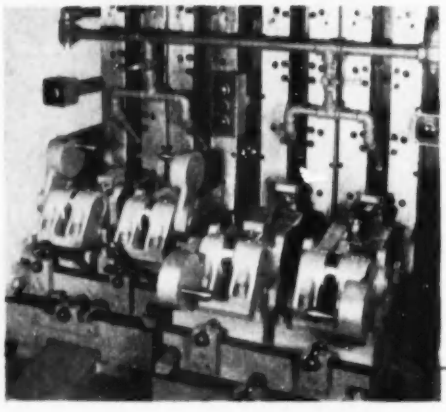
CINCINNATI



CYLINDER CLEARANCE

Part name..... Connecting rod
Material..... Steel forging
Operation..... Broach cylinder clearance
Stock removal.... 3/32" per side
Production..... 708 per hour
Machine..... CINCINNATI No. 10-54 Duplex Vertical Hydro-Broach completely equipped by Cincinnati Application Engineers

CINCINNATI



BOLT BOSSES AND NUT SEATS

Part name..... Connecting rods and caps
Material..... Steel forging
Operation..... Broach sides of bolt bosses, bolt and nut seats
Stock removal.... 5/16" max.
Production..... 230 rods and caps per hour
Machine..... CINCINNATI No. 10-66 Duplex Vertical Hydro-Broach, completely equipped by Cincinnati Application Engineers

typical hydro-broach operations ON CONNECTING RODS AND CAPS

CINCINNATI Hydro-Broach Machines, completely equipped for production by Cincinnati Application Engineers, offer high production at low cost and minimum maintenance expense. Three examples illustrated here are typical set-ups for connecting rods and caps; the type of work which must be produced without interruption. ¶ These machines are in short supply at this time, but you might like to know more about them for future applications. Write for catalog No. M-1709-1.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

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MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 108, No. 3 **February 1, 1953**

Reo Forms Unit to Lease Trucks

Reo Motors, Inc., has set up a separate subsidiary for truck leasing. It will be known as Reo Truck Leasing, Inc., and will operate on a nationwide basis from 18 Reo branches. The leasing unit will operate independent of the regular Reo branch operations and, in effect, will rent space from and be a customer of Reo branches for trucks, parts, and service.

Regular standard leasing procedure will be followed with contracts to include servicing and maintenance and any other combination of fixed charges, such as parts, tires, gasoline, lubricants, washing, polishing, and garaging. The company also will have the fleet registered and will pay all excise taxes and insurance. In fact, it will supply trucks and all operating requirements except the driver if the customer requests it.

J. S. Scherer, Jr., Reo president, also heads the new leasing firm. Other officers are: E. W. Reese, vice president and general manager; Russell A. Smith, vice president and treasurer; and F. J. Force, secretary. The officers, together with A. L. Struble, Reo vice president in charge of sales, and Robert J. Darragh, Reo tax consultant, comprise the board of directors. Organizational work has been completed in 11 cities and operations are scheduled for other major markets throughout the country.

New Production Line Ups Packard Output

As part of its program to produce two distinctly separate lines of cars, Packard Motor Car Co. has put into operation a new production line which will be devoted exclusively to the medium priced Clipper line. The company is aiming at a 50 per cent increase in output and sales this year and has added 5000 workers since Nov. 1, bringing the total to 20,000, the highest in peace-time history. As a result of the increased production facilities, aided by the new assembly line, Packard was able to get into production rapidly of its hard top sportster model earlier than expected and is now supplying its dealers. It also will make possible the highest production rate in the company's history. Packard also is preparing special production facilities for custom cars of both formal limousine and sports convertible types.

FURNITURE FREIGHTER

Fageol furniture vans have been developed around Twin Coach Super Freighter trucks using International Harvester components. Bridge type construction is said to increase capacity by 200-500 cu ft and by up to 5000 lb over other types of same size.

Mooney Made President of F. L. Jacobs Company

James D. Mooney, well known in the automotive industry and a former executive of General Motors Corp. and Willys-Overland Motors, Inc., has been named president of F. L. Jacobs Co., Detroit. His election is the latest in a turbulent upheaval involving management of the company. He succeeds Neil A. Moore, who took the post of president last November and who resigned after a recent stockholder revolt unseated seven of nine directors. Mr. Mooney was president of Willys-Overland from 1946 to 1949, and since that time has operated a management consultant firm in New York. Other executive changes of the company include election of John F. Jacobs to vice-president; C. S. Jacobs, a former president, to vice-president, treasurer, and assistant secretary; and George R. Squires, of New York, as secretary.

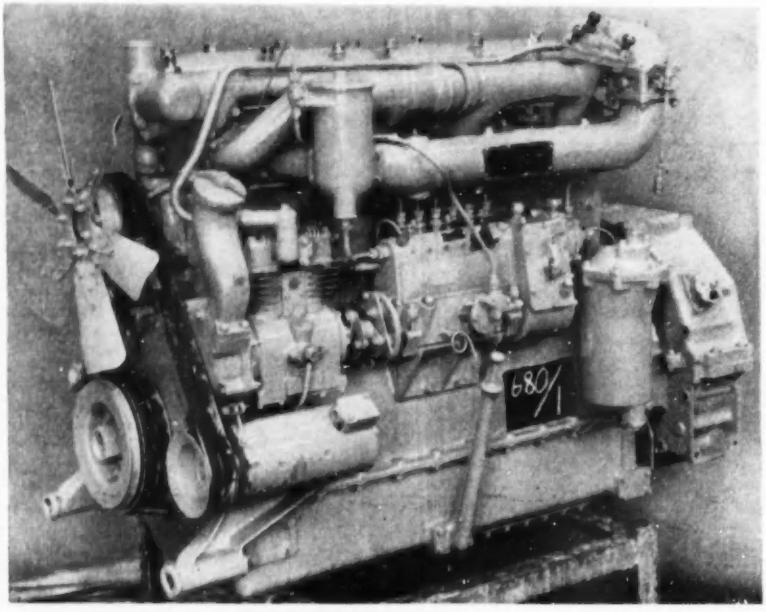
Guided Missile Contract Goes to Chrysler

Chrysler Corp. has been awarded a guided missile research and development contract to be carried on in part of the new 2 million sq ft Navy-owned plant being built just outside of Detroit and originally scheduled for jet engine production. The Detroit Ordnance District will administer the multi-million dollar contract which was awarded by the Redstone Arsenal in Huntsville, Ala. George E. Huebner, Jr., who had been chief engineer of research for Chrysler, will be in charge of the project as executive engineer. Chrysler estimates that a large number of engineers and technicians with special training will be required for the project and several of the company's leading engineers have been assigned to it. Initially a major objective will be development of an organization of specialists in the mechanical, electrical, electronic, chemical, metallurgical, physical, structures, and administrative fields.

New Car Registrations 4.15 Million in 1952

Latest but still incomplete registration figures compiled by R. L. Polk indicate that about 4.15 million new passenger cars and 820,000 new trucks were registered last year. By comparison, new car registrations totalled 5,060,903 in 1951; 6,326,438 in 1950; and 4,838,342 in 1949.

News of the AUTOMOTIVE



OFF-ROAD DIESEL

Leyland of England added this six-cyl Diesel engine to its line, for earth-moving machinery. It develops 150 bhp at 2000 rpm and 450 ft lb at 1100 rpm with 677 cu in. displacement. Two-part cylinder head carries overhead valves. Dry liners are one piece casting, and crankshaft is nitrided.

Volkswagon in Canada to Stay

A German automobile company, VW Canada Ltd., a subsidiary of Volkswagenwerk, plans an assembly plant in Canada, probably in the heavy-industrialized section of Southern Ontario near Toronto.

Werner Jansen, who arrived from Germany recently to assume charge of Canadian operations at the company's official opening here this month, said the company is in Canada to stay.

"We have already made a heavy investment here but our plans for the future envisage operations on a scale commensurate with the company's operations in Europe. It is our intention to start building an assembly plant in 1954 if sales warrant it and we are already looking over possible sites," he said.

The company, one of Europe's biggest automobile manufacturers, currently markets in Canada a small two-door car for about $1750. Principal distinguishing feature of the car is its two-cyl opposed, air-cooled engine mounted at the rear.

Volkswagenwerk currently supplies 40 per cent of all motor vehicles sold in Germany in addition to most of the European export business to Sweden, Holland, Belgium and Switzerland. The company employs more than 15,000 workers and produces 12,500 units a month.

Plastic Dies Used For GM Sport Cars

The use of plastic dies for lower volume automotive production is well typified in the three custom convertibles to be offered by General Motors divisions. Basic body for the Buick Skylark, Olds Fiesta, and Cadillac El Dorado are turned out by Fisher on plastic dies. The divisions attain their styling characteristics through individual styling of hoods, fenders, chrome moldings, grilles, and exterior trim and appointments.

The price of the Cadillac El Dorado was set at $7750, plus taxes and delivery.

Chevrolet Shaves Price on Four Models

Chevrolet has announced that prices of its 1953 models are unchanged to $39 below comparative 1952 models. Reductions include business coupe, $5; hardtop sport coupe, $39; convertible, $35; and station wagon, $24.

Chevrolet also announced prices on its Bel Air models, a new series which it is introducing in the lower medium priced field. The prices range from $82 to $113 higher than comparable models in the "Two-Ten" series, the higher priced of the two regular lines.

Chevrolet is including directional signals on all cars shipped from the factory as an extra-cost option which dealers will remove if the customer does not elect to take them. Price of power steering as an option has been set at $177.55. Powerglide is available on the "Two-Ten" and Bel Air Series only and is priced at $178.35.

Studebaker Holds Prices

Reductions in list price of approximately $100 on its hard top convertible models and of $46 on the V-8 Land Cruiser sedan featured Studebaker's listing of prices on its new 1953 models.

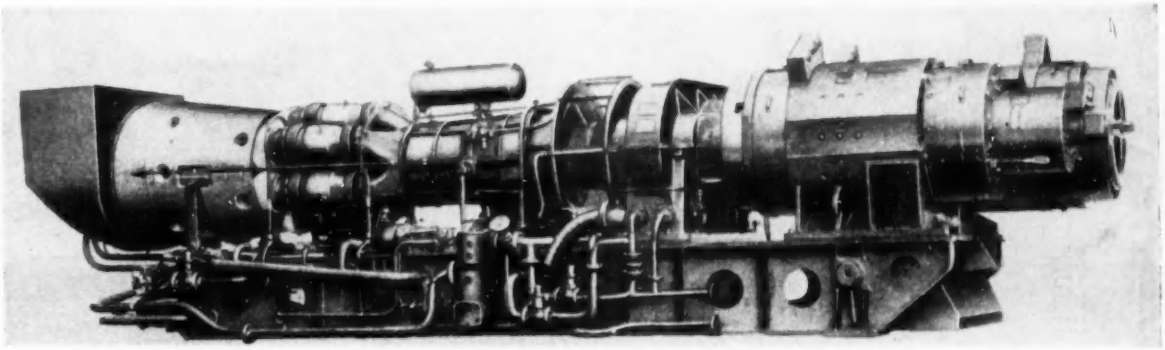
List prices on four-door and two-door sedans, other than the Land Cruiser, were virtually unchanged and were for the purpose of rounding out factory list prices to the nearest $5. The 1953 five-passenger coupes are priced only $10 to $12 over their 1952 counterparts which they exceed in wheelbase by 5-½ in.

Chrysler Holds N. Y. Showing of New Cars

Chrysler Corp. put its new models on display at the Chrysler International Salon in the Chrysler Building in New York Jan. 15 through the 23rd. Chrysler showed 1953 models of all its car lines plus two special cars. One is the "Special," an experimental model built in Italy and using a modified Chrysler chassis. The other was a race car powered by a Chrysler V-8 engine developing 404 hp.

The New Yorker club coupe also was introduced at the salon.

AND AVIATION INDUSTRIES



GAS TURBINE FOR BRITISH RAILWAYS

This 3000-hp gas turbine-electric unit will power British passenger trains at up to 90 mph. The 7000-rpm turbine drives three main generators at 1600 rpm through single reduction gearing. Builder is Metropolitan-Vickers Electrical Co., Ltd.

Union Asks Reopening of Five-Year Contracts

How valid is a union contract? A possible answer to that question may result from negotiations between the automotive industry and UAW-CIO over union demands for changes in the present five-year contracts. The union is insisting that the contracts be revised by Mar. 1, ostensibly because of a change to a new cost-of-living index to be used by the Government.

The earliest any of the five-year contracts can be reopened is May 29, 1955 under provisions of the original agreement, but Walter P. Reuther, head of the NAW-CIO, is insisting that the change in the BLS index constitutes a valid reason for reopening discussions. Actually, it is no secret that he is using the new index issue primarily as a wedge to make unrelated demands announced as objectives several months ago.

These include making 20 cents of the 25 cents an hour added since the cost-of-living program went into effect a permanent part of the base pay and not subject to downward revisions in case of a steep drop in the index; an increase of from $20 to $25 a month in pensions, including those of workers already retired; an increase to five cents an hour from four cents in the annual improvement factor; revision in wage scales for skilled trade groups and relaxing of provisions calling for compulsory retirement at age 68.

Automotive companies have made no official comment but are generally understood to take the stand that current contract language provides for the contingency of a change in the method of computing the BLS index without reopening the entire contract for negotiation. Reuther has taken the position that if changes are not made by March 1 "there will be no contract."

Wayne U. Studying Car Safety Design

Staff members of Wayne University, at Detroit, have launched a study of automotive design involving features concerned with passenger safety in the event of accident. The group includes engineers and doctors and will make recommendations to the automobile industry after the program is completed.

Initial findings indicate that head injuries account for the largest number of fatalities in automobile accidents, with most of such injuries occurring near the windshield. Preliminary suggestions include padding the instrument panel and designing it so that it will yield somewhat under impact, and installing the windshield so that it will swing outward from the top when pressure is applied. Also suggested is a flat metal instrument panel surrounded by a layer of sponge rubber.

Overtime Scheduling Is Employer's Right

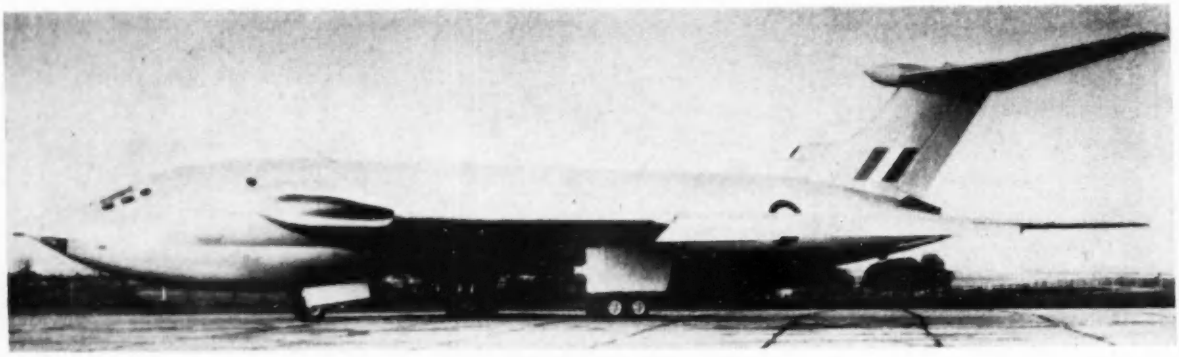
A Canadian arbitration board ruled on Jan. 8, at Toronto, that an employer has the right to require overtime work from his employees. The ruling was in favor of the farm equipment manufacturer Massey-Harris Co., and against the local of the UAW-CIO. The ruling is expected to have important repercussions in future union demands.

The case came before the arbitration board because the Ontario Labor Relations Board was recently asked to declare the refusal to work overtime constituted an iliegal strike. It held that this was not within its jurisdiction.

In its submission the company claimed overtime was necessary in this case to package and ship parts to service broken combines during the western Canadian harvest; to complete a number of new type combines in great demand during the harvest season, and for a small urgent defense order for the Canadian government. The union had refused to agree to overtime for its members. The practice at Massey-Harris has been to consult the union on overtime, and in most cases the union concurred.

The arbitration board ruled that unless management's rights to schedule overtime are specifically limited under a collective agreement, imposition of overtime comes within the ordinary rights of the employer.

News of the AUTOMOTIVE



FIRST CRESCENT BOMBER

The four-jet Handley Page 80 bomber made its maiden flight recently. Crescent-shaped leading edge of the wing is said to improve control over a wide speed range and particularly at the lower speeds near the ground. Ordered in quantity, the bomber is claimed to be unexcelled in speed, range altitude and economy.

Yale & Towne to Lease Materials Handling Equipment

A nationwide plan to permit users to lease industrial lift and fork trucks and allied equipment, rather than buying them, has been announced jointly by the Philadelphia Div. of Yale & Towne Manufacturing Co., and C.I.T. Corp.

The plan enables factories, warehouses and others to obtain materials handling equipment by paying monthly rentals as the machines are used. Under the program, Yale & Towne's Materials Handling Div. at Philadelphia will negotiate leasing agreements for the equipment with potential users. C.I.T. will then purchase the required equipment from Yale & Towne and lease it to the user for an agreed period of time.

Automotive Specialty Now Ideal Subsidiary

Automotive Specialty Corp. recently became a subsidiary of Ideal Corp.

The former manufactures starting, lighting and ignition products, while the latter produces hose clamps and switches.

Willys 1952 Production Highest in 22 Years

With the aid of government orders, Willys last year was able to increase its production about 35 per cent over 1951 to the highest number of vehicles in 22 years. Last year Willys built 168,216 vehicles, of which about one-third was represented by jeeps for the military services. According to Wards reports, Willys last year built 28,226 passenger cars, making it number 17 among the 19 makes in the industry. In truck output Willys was in sixth place with 119,371 units.

Fisher Moves Aircraft Engineering Section

Fisher Body Div. of General Motors Corp. has moved its aircraft engineering section to its new plant at Grand Rapids, Mich. The plant there is in production of fuselage sections for F-84 fighter planes and engineering operations are being moved there to consolidate production.

Twin Coach to Work On Grumman Order

Twin Coach Corp. will start full-scale production in February or March on a new multi-million dollar order for Grumman Aircraft Corp. Operations in 1953 are expected to be at least as good as 1952, when they reached an all-time high.

Powdered Metal Products Adds to Plant Space

Powdered Metal Products Corp. of America is increasing its production capacity by approximately 50 per cent by adding a new 6000 sq ft addition to its Chicago facilities. Cost of the building and machinery is estimated at about $135,000. It will be equipped with new sintering furnaces for manufacturing powdered metal parts such as gears, bearings, and other components.

Eleven Months' Retail Car Sales Valued at $7,867,000,000*

	November 1952				Eleven Months 1952			
	Sales		Dollar Volume		Sales		Dollar Volume	
Price Group	Units†	% of Total	Dollars	% of Total	Units†	% of Total	Dollars	% of Total
Under $2,000	192,842	53.87	$340,216,313	45.34	1,958,996	52.51	$3,460,222,722	43.98
$2,001 to $2,500	103,651	28.96	231,016,302	30.79	1,111,797	29.80	2,466,795,000	31.36
$2,501 to $3,500	46,123	12.89	122,757,677	16.36	492,621	13.21	1,327,154,232	16.87
Over $3,500	15,333	4.28	56,364,040	7.51	167,014	4.48	612,901,654	7.79
Total	357,949	100.00	$750,354,332	100.00	3,730,428	100.00	$7,867,073,608	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.
†—New registrations of American made cars only. Does not include imported foreign cars.

AND AVIATION INDUSTRIES

TWIN ENGINE CESSNA MAKES FIRST FLIGHT

Powered by the new Continental O-470-A 225 hp engine, the five-place Cessna Model 310 made its first flight last month. First use of wing tip tanks for safety, semi-monocoque engine mounting, and internal radio antenna in a commercial private plane is claimed by the maker. Length is 27 ft, span is 36 ft. Continental engine is first of the O-470 series to reach production. Oil lines are internal, and full flow filter is mounted in the crankcase. Separate accessory case is gone, drives being inside the crankcase. A new low-cost starter motor, new mount for constant speed metal propeller, and automotive-type hydraulic valve lifters are other features. This engine is also used in the new Cessna single-engine four-place Model 180 which is now in production at the company's Wichita, Kans., factory.

Olds Starts Output of Jet Assemblies

Oldsmobile has started initial production of turbine and compressor units for the J-65 jet aircraft engine at its Lansing, Mich., plant. Several units already have been delivered for assembly into engines to be built by Buick. The pilot line originally was located in the Olds gun plant but in December was moved to the new 70,000 sq ft jet engine plant on the western outskirts of Lansing. Most of the machinery required has been in the nature of special equipment, since tools normally used in the automotive industry are not suitable.

The turbine compressor includes more than 1000 steel and aluminum blades mounted in 13 stator stages, 13 rotor stages, and two turbine stages. Tolerances are as close as .0001 inch. Special machines required include turbine wheel lathes, profilers and airfoil grinders, broaches, multiple-spindle drilling machines, rotary grinders, and chucking grinders.

K-H Supplies Buick With Power Brakes

Since publication of the 1953 Buick story (see AUTOMOTIVE INDUSTRIES Jan. 1, 1953), it has been announced that the power brake system adopted as standard equipment on the Skylark and optional on Roadmaster models is supplied by Kelsey-Hayes Wheel Co. This vacuum power brake system, adapted by Buick engineers for installation in 1953 models, stems from Kelsey-Hayes' experience in supplying some hundreds of thousands of installations on production motor cars in recent years.

"500" Race Opened to Turbine Cars

Anyone with a turbine-powered racing car may enter it in the 500 mile Indianapolis Speedway race next Memorial Day. Speedway officials announced that competition will be open to turbine engine cars this year but that none is expected to enter until 1954. About 80 cars are expected to compete for the 33-car starting lineup.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	November 1952	October 1952	November 1951	Eleven Months 1952	Eleven Months 1951	Per Cent Change: Nov. over October	Per Cent Change: Nov. over Nov. 1951	Per Cent Change: Eleven Months 1952 over 1951
1	New England	22,128	22,243	17,701	218,529	270,498	— .52	+25.01	—19.31
2	Middle Atlantic	71,110	69,748	62,416	712,132	908,313	+ 1.95	+13.93	—21.60
3	South Atlantic	41,291	45,247	39,253	442,984	561,938	— 8.74	+ 5.19	—21.17
4	East North Central	90,413	94,256	80,089	957,907	1,220,448	— 4.08	+12.89	—21.51
5	East South Central	18,763	20,994	18,241	176,955	223,695	—10.63	+ 2.86	—20.89
6	West North Central	32,557	37,798	32,594	389,056	493,002	—13.87	— .11	—25.14
7	West South Central	33,151	35,179	35,305	343,841	423,335	— 5.76	— 6.10	—18.78
8	Mountain	12,929	12,830	12,841	129,782	161,128	+ .77	+ .09	—19.45
9	Pacific	37,914	45,090	33,659	407,302	488,462	—15.91	+12.64	—16.62
	Total—United States	360,256	383,385	332,099	3,758,488	4,750,819	— 6.03	+ 8.48	—20.89

States comprising the various regions are:—Zone 1: Conn., Me., Mass., N. H., R. I., Vt.—Zone 2: N. J., N. Y., Pa.—Zone 3: Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4: Ill., Ind., Mich., Ohio, Wis.—Zone 5: Ala., Ky., Miss., Tenn.—Zone 6: Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7: Ark., La., Okla., Tex.—Zone 8: Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9: Cal., Ore., Wash.

News of the AUTOMOTIVE

Jet Parts Job Dropped at Westinghouse Plant

Original plans to build jet engine parts at the new Westinghouse plant under construction near Columbus, O., have been abandoned and the plant will be used entirely for civilian production when it goes into operation about next August. The facility is a dual purpose plant, however, and could be converted immediately to defense work in event of a national emergency. An extra production line will be installed in a plant owned by the Navy and operated by Westinghouse at Kansas City, Mo., and will be ample to meet present requirements for jet engine components.

Fruehauf French Investment Can Be Converted

The Mutual Security Administration has issued a guaranty of currency convertibility covering an investment of $250,000 in France by the Fruehauf Trailer Co.

This additional investment gives Fruehauf a 62 per cent interest in the French corporation, Fruehauf-France, S. A., which will expand its plants to include manufacture of semi-trailers and parts. The agreement also insures the parent company of conversion to dollars of up to $187,500 in potential profits.

Ford Top Producer of Station Wagons

Ford Motor Co., long dominant in the station wagon market, was in first place with that model last year with 30.55 per cent of the industry's total, according to national registration figures through October, the latest available. Ford's station wagon sales last year jumped 13 per cent despite an overall reduction of about 14 per cent in the number of cars built. The company also held first place in the industry in two other special body type models: the hardtop coupe and the regular convertible. The hardtop accounted for 22.84 per cent of industry sales for that model and the convertible registered 20.02 per cent of the market. Total sales of new and used cars and trucks by Ford dealers last year amounted to 2.34 million vehicles.

Automotive Antitrust Suits Being Pressed

This year apparently will see some disposal of antitrust suits started in recent years against automotive companies. The suit against du Pont and involving General Motors and U. S. Rubber Co. already is under way at Chicago, although the Government continually is reducing it in scope. The Justice Department also is reported to be pushing its civil action against the three largest automobile wheel manufacturers which it accuses of conspiring to monopolize that industry. Companies involved are Kelsey-Hayes Wheel Co., Budd Co., and Motor Wheel Corp. The suit originally was filed in June, 1951, charging violation of the Sherman Antitrust Act and unlawful conspiracy to monopolize the wheel business. The National Automotive Parts Association also is under fire from the antitrust division which has charged it with price fixing and negotiating with major automobile companies to control the parts industry.

Cleveland Steel Prodcts Plans New Facilities

Cleveland Steel Products Corp. is planning to build a new 100,000 sq ft plant at Cleveland. It is estimated the plant will cost $1.5 million and the company will spend another $1 million for new equipment. When the new plant is completed next October it will provide an expansion of about 150 per cent over present facilities. Eventually it is planned to dispose of the current facilities.

Mt. Clemens Metal Buys National Stamping Co.

Mt. Clemens Metal Products Co. has acquired all assets of National Stamping Co., of Detroit, through a stock merger. National Stamping is a large supplier of pressed metal parts and assemblies to the automotive industries and will operate as a division of Mt. Clemens Metal Products. Fred W. Beyer, formerly president of National Stamping, will become vice-president of Mt. Clemens. T. L. Baker, formerly vice-president and general manager of National Stamping, also becomes a vice-president of the parent company.

1952 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Eleven Months' Totals

MAKE	November 1952	October 1952	November 1951	ELEVEN MONTHS Units 1952	Units 1951	Per Cent of Total 1952	Per Cent of Total 1951
Chevrolet	81,667	88,811	68,262	776,458	1,001,421	20.64	21.10
Ford	73,948	79,037	56,049	652,309	806,421	17.36	16.97
Plymouth	24,202	31,639	30,986	381,070	516,609	10.14	10.87
Buick	29,099	30,753	26,485	286,815	367,149	7.63	7.73
Pontiac	23,786	27,114	22,379	243,582	314,474	6.48	6.62
Dodge	19,471	16,650	20,483	222,935	281,500	5.93	5.93
Oldsmobile	20,420	21,802	18,097	200,934	256,285	5.35	5.39
Mercury	18,247	15,620	16,398	163,310	217,848	4.35	4.59
Studebaker	12,722	12,045	14,779	142,099	193,003	3.78	4.06
Nash	11,522	12,494	11,548	129,719	131,079	3.45	2.76
Chrysler	8,404	5,710	8,904	102,026	141,293	2.71	2.97
Cadillac	7,661	9,043	7,057	83,029	90,542	2.21	1.91
De Soto	6,906	6,767	8,140	81,526	104,737	2.17	2.20
Hudson	4,845	6,255	5,930	72,826	91,288	1.94	1.92
Packard	3,796	4,824	4,472	60,197	62,377	1.60	1.31
Kaiser	3,654	3,494	3,135	37,516	49,490	1.00	1.04
Willys	3,417	3,648	1,628	37,158	24,811	.99	.52
Henry J	1,891	1,430	3,011	26,926	48,878	.72	1.03
Lincoln	2,210	3,266	1,977	26,220	24,398	.70	.51
MG (British)	493	667		6,876		.18	
Austin (British)	280	322	420	4,543	3,447	.12	.07
Hillman	371	485		4,405		.12	
Ford (British)	316	426	279	3,441	3,241	.09	.07
Jaguar (British)	319	357		2,963		.08	
Crosley	47	65	310	2,645	5,056	.07	.11
All State	111	114		1,476		.04	
Misc. Domestic	18	27	312	942	2,977	.03	.06
Misc. Foreign	433	500	1,148	4,542	12,495	.12	.26
Total—All Makes	360,256	383,385	332,099	3,758,488	4,750,819	100.00	100.00

* Based on data from R. L. Polk & Co.

AND AVIATION INDUSTRIES

Fairchild Gets New $44 Million Order

Fairchild Engine & Airplane Corp. has received an additional $44 million government order for items of a "highly classified nature" relating to the Engine division's line of jet engines and other power plants. The company also has signed a long-term lease for two new buildings in an industrial area at Roosevelt Field, L. I. They will provide 250,000 sq ft of floor space.

French Parts Men in U. S. To Study Our Techniques

Seeking ideas and techniques to increase productivity and reduce manufacturing costs in its automobile industry, France has sent 13 automobile parts experts to the U. S. for a five-week study of American automobile and affiliated industries. The study is sponsored by the Mutual Security Agency under its productivity and technical assistance program.

Plant for Bowers

The opening of a battery manufacturing plant at Hialeah, Fla., by the Bowers Battery & Spark Plug Co. has been announced by C. P. Bowers, president. The Hialeah plant is the sixth plant in the Bowers operation. Other plants are at Reading, Pa., Boston, Mass., Paterson, N. J., New Philadelphia, O., Macon, Ga., and Monterrey, Mexico.

Temco to Build

Approval has been received from the Navy on the first three units of a building program which will expand the facilities available to Temco Aircraft Corp. for production of the McDonnell F3H Demon and other aircraft.

The units approved at this time include a 58,000 sq ft addition to the Temco office building, which will more than double office space now available, a 30,000 sq ft paint hangar and a 7500 sq ft paint stripping building. Total cost of the three units is expected to run to $2.2 million. Chance Vought Aircraft, as prime lessor of the Naval Industrial Reserve Aircraft Plant, will supervise the new construction.

New Semco Plant

Service Machine Co., Elizabeth, N. J. announces the completion of a new plant for general tooling and production. The plant area, devoted to engineering, heavy machine manufacture, tool and die making, and light assembly and machining now utilizes 21,000 sq ft of floor space and is said to be the largest general machine shop in the North Jersey area. The firm manufactures Semco brake dies and nibbler presses.

Canadian Sabres Peak

Canadian production of the F-86-E Sabrejet will hit its peak of 40 a month within the next four weeks.

A spokesman for Canadair Ltd. said Sabres are rolling off the assembly line at the Montreal, Que., plant at a rate of nine a week. More than 400 have been produced thus far. He said production will reach two a day for each day of the plant's five-day week by February. The plant has a working force of 13,000, which will be increased to a peak of 16,000 by March.

Ford Defense Orders Total $1.5 Billion

Ford Motor Co. has more than $1.5 billion worth of defense work now on order, according to the company's year-end statement. It includes piston and jet aircraft engines, 3.5 in. rockets, T-48 tanks, tank engines, and bomber wings. The company also is involved in a development program on a new military jeep and experimental work on an automatic weapon. Dollar value of the company's defense work last year was twelve times that attained in 1951.

The Navy last month increased its jet engine order, which Lincoln-Mercury Div. will build at Romulus, Mich., to $154 million. This will carry production well into 1955.

Ford will double production of replacement tank engines and parts at its Rouge plant under orders from Army Ordnance. Ford has a contract totaling $40 million for 500 hp V-8 liquid cooled tank engines and parts for replacement in vehicles used in Korea, Europe, and to some extent in the U. S. Approximately 100 employes are working on the engine program now and the plant is producing at maximum capacity on a single shift.

1952 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Eleven Months' Totals

MAKE	November 1952	October 1952	November 1951	ELEVEN MONTHS Units 1952	Units 1951	Per Cent of Total 1952	Per Cent of Total 1951
Chevrolet	25,610	27,813	25,219	246,574	329,538	33.20	34.99
Ford	16,008	15,284	19,027	162,533	234,664	21.90	24.93
Dodge	7,972	9,180	8,427	94,445	99,103	12.73	10.53
International	7,067	8,720	8,099	86,493	89,586	11.65	9.52
G. M. C.	6,809	8,105	7,605	73,098	94,224	9.85	10.01
Studebaker	2,295	2,899	2,901	26,791	30,495	3.61	3.24
Willys Truck	1,090	1,244	1,245	10,652	14,341	1.44	1.52
White	906	1,030	950	10,232	11,540	1.38	1.23
Willys Jeep	744	777	686	7,627	8,174	1.03	.89
Mack	493	697	687	6,667	9,256	.90	.98
Diamond T	256	323	312	3,193	4,259	.43	.45
Reo	330	381	242	3,140	3,231	.42	.34
Divco	170	242	260	2,586	3,587	.35	.38
Brockway	185	171	146	1,675	2,079	.21	.22
Autocar	147	156	197	1,455	1,979	.20	.21
Federal	50	74	71	760	947	.10	.10
Kenworth	56	61	69	665	643	.09	.07
F. W. D.	62	73	45	505	463	.07	.05
Pontiac	75	48	78	500	836	.07	.09
Peterbilt	18	24	32	226	290	.03	.03
Sterling	19	29	18	224	311	.03	.03
Misc. Domestic	97	135	179	1,987	1,461	.27	.16
* Misc. Foreign	18	14	22	268	237	.04	.03
Total—All Makes	70,477	77,486	78,517	742,198	941,254	100.00	100.00

* Based on data from R. L. Polk & Co.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Tocco Div., Ohio Crankshaft Co. — O. M. Marquardt was named manufacturing manager recently.

Ford Motor Co. — Logan C. Miller, vice-president in charge of the basic products group, retired on Jan. 1. He is now a consultant to the Bower Roller Bearing Co.

DeSoto Div., Chrysler Corp.—R. M. Rowland fills the new post of director of merchandising.

Joseph T. Ryerson & Son, Inc.—**W. R. Lockwood** has been appointed manager of the Seattle, Wash., service plant.

Aluminum Co. of America—**Sanford H. Bennett** was named chief industrial engineer of the casting division. He is succeeded as Buffalo, N. Y., works manager by **H. E. Cook.**

Taylor Dynamometer and Machine Co.—**Frank R. Wilson,** formerly vice-president of the firm, now represents the company in Texas, Oklahoma, and Louisiana under the name of Wilson-Toler and Co., Inc., of Houston, Tex.

Brown-Lipe-Chapin Div., General Motors Corp.—**Stanford Landell** has transferred from Oldsmobile to become director of engineering and sales.

Campbell, Wyant and Cannon foundry Co.—**William S. Halfpenny** has returned to the sales department, after being with several firms in the East.

Dynamatic Corp.—**Eugene Pohl,** formerly with Marathon Electric Mfg. Corp., has been named manager of the Philadelphia, Pa., office just opened.

Hilier Helicopters — **Raymond A. Young** has been made staff engineer.

White Motor Co. — **Thomas W. Lauer** has been named general service manager.

Consolidated Machine Tool Corp.—**Roger E. Vaughan** has been promoted to assistant general manager.

Rinshed-Mason Co., West Coast Div.—**Edward S. Hawkins** has been made vice president and general manager, while **Ralph Matters** is now sales manager.

Marion Forge Div., Eaton Mfg. Co.—Samuel H. Wood, former chief engineer of the Timken - Detroit forge division, has been named manager.

South Wind Div., Stewart-Warner Corp. —William V. Ryan has been promoted to general sales manager.

Kold-Hold Mfg. Co. —Charles E. Glennon has been appointed sales manager for the Platecoil Div.

Consolidated Vultee Aircraft Corp. —**J. V. Naish** was elected vice president. Other appointments made were: **J. G. Zevely,** director of sales and contracts, and **Ralph L. Bayless,** chief development engineer.

Textileather Corp.—**Stanley P. Sexton** is now automotive sales manager.

Porter Muffler Mfg. Co., Inc.—**Harold J. Buzick** has joined the firm as sales manager.

Ford Div., Ford Motor Co.—**Chester E. Bowie** was named manager of product sales and service.

Allison Div., General Motors Corp. —**Harold H. Dice** has been appointed assistant general manager.

Price Battery Corp.—**D. S. Shipley** has been appointed trade sales manager.

Hydraulic Press Mfg. Co.—**William H. Bennett** has been promoted to director of engineering.

Trailmobile Inc.—**Walter Hasenzahl, Jr.,** has become manager of manufacturing.

Borg-Warner Corp., Atkins Saw Div.—**J. C. Kuhn** is now vice president for sales.

Kearney and Trecker Corp.—**J. Robert Jones** is now sales manager for standard machine sales, while **William J. Huseby** is assistant sales manager.

Chrysler Corp. — **Neil H. McElroy,** president of Procter and Gamble, and **Raymond T. Perring,** president of the Detroit Bank, were elected directors to replace **Harold E. Talbott** and **Joseph M. Dodge,** who have joined the Government. **M. T. O'Donnell** was named works manager of the Chrysler Sales Div.

F. L. Jacobs Co.—**James D. Mooney,** former president of GM Overseas Corp., was elected president last month.

Ford Motor Co.—**Alvis M. Cole** is now manager of quality control at the Buffalo, N. Y., assembly plant. He succeeds **Edward J. Young, Jr.,** who is now manager of quality control at the Ford Chicago aircraft plant.

Hyatt Bearings Div., General Motors Corp.—**C. W. Kalchthaler** is now assistant to the general sales manager.

American Brake Shoe Co., American Brakeblok Div. — **Donald K. Rennie** was made vice president.

Oldsmobile Div., General Motors Corp. —Elliott M. Estes has been appointed body engineer for the division.

Chrysler Corp.—**J. Harold Becker** has become general traffic manager, while **Carl J. Demrick** is staff master mechanic. **Neil H. McElroy** and **Raymond T. Perring** were elected to the board of directors. Other appointments recently announced are: **Fredrick G. Force**, supervisor of the Central Estimating Dept., and **J. Fred Mitchell**, director of public information at the Delaware Tank Plant.

Jacobs Aircraft Engine Co.—**L. F. Trew** has been appointed production manager, **B. D. Miller** is manager of production engineering, and **Earl J. Kachel** is manager of quality control.

Rimshed - Mason Co. —Newell P. Beckwith has been appointed vice - president and technical director.

GMC Truck and Coach Div.—Edwin P. Crenshaw is now general sales manager of the coach division.

Standard Pressed Steel Co.—George A. Gade has been made vice - president in charge of sales.

Allison Div. of General Motors Corp.—Appointment of **Harold H. Dice** as assistant general manager has been announced.

Kaiser-Frazer Corp., Aircraft Div. —**W. L. Van Horn** has been named administrator of estimating.

Packard Motor Car Co.—William H. Klenke, Jr., is now assistant to the vice-president in charge of defense operations, and J. P. Ostrander is manager of marine and industrial sales.

American Steel & Wire Div. of U. S. Steel Corp.—**John A. Slenker** is now assistant vice-president of operations. He succeeds **Van H. Leichliter**, who is promoted to vice-president of operations.

Delman Co.—**John B. Langley** has acquired an interest in the firm and is now vice-president in charge of operations.

Babcock and Wilcox Co.—Harold D. Newell and John J. B. Rutherford have been advanced to consulting metallurgist and chief metallurgist of the Tubular Products Div.

Studebaker Corp. of Canada, Ltd.— **D. C. Gaskin** has been elected president.

Pontiac Motor Div. of General Motors Corp. — **Charles O. Johnson** was named assistant to the general manufacturing manager, replacing **David J. Dunlop**, who has retired. **Charles L. DeLorge** is now motor plant superintendent, vice **C. F. Heymann**, retired. His assistant is **G. R. Scharf. H. A. C. Anderson** was promoted to the staff of the division manufacturing manager, and **D. P. Stewart** was named government relations director.

George L. Nankervis Co.—Elliott Sanderson has joined the firm as a member of the sales-engineering staff.

(*Turn to page* 132, *please*)

Necrology

Joseph M. Hendrie, 62, car distribution manager for Chevrolet Motor Div., General Motors Corp., died Jan. 12, in Detroit, Mich.

Walter L. Maxson, 60, vice president-research for Oliver Mining Div., U. S. Steel Corp., died Jan. 8, in Duluth, Minn.

Frank M. Mason, 42, vice president of U. S. Electrical Motors, Inc., died Dec. 27, in Milford, Conn.

Charles H. Currier, chairman of the board, Kewanee-Ross Corp., died Dec. 22, in Buffalo, N. Y.

Louis C. Schellin, 59, executive of Industrial and General Products Div., B. F. Goodrich Co., died Jan. 4, in Akron, O.

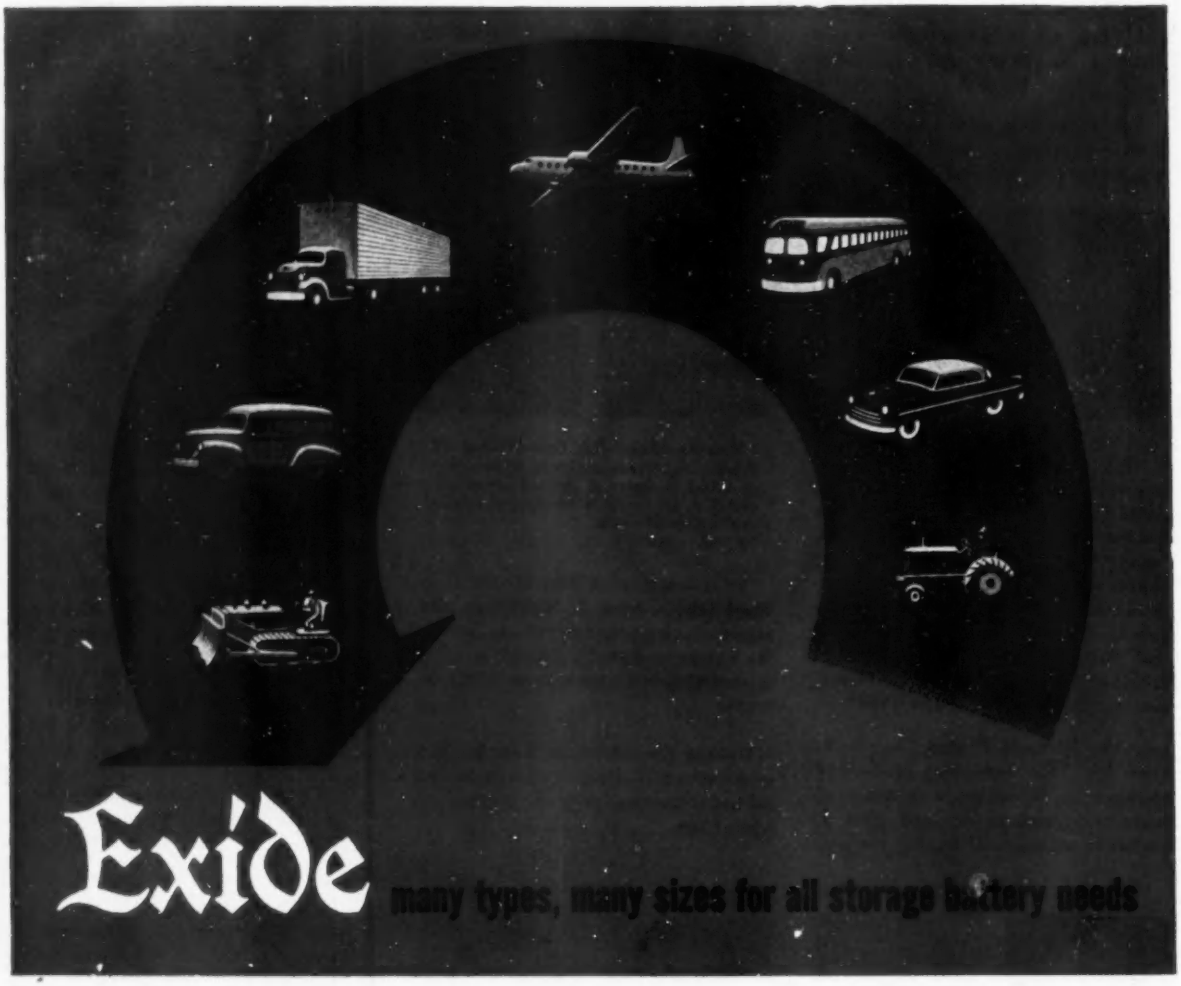
W. E. Byrne, 58, mid-west district manager for Simonds Abrasive Co., died Dec. 27, in Chicago, Ill.

Clarence Snyder, 72, chairman of the board of Snyder Tool & Engineering Co., died Jan. 4, in Fort Lauderdale, Fla.

Frank H. Janke, 79, retired treasurer of American Brake Shoe Co., died Jan. 2 in Suffern, N. Y.

Wellington F. Evans, 73, founder of Metal Products Co., Standard Screw Products Co., and the old Detroit Motorbus Co., died Jan. 4, in Holly, Mich.

Henry T. Ewald, 67, board chairman of Campbell-Ewald Co. advertising agency, died at Detroit on Jan. 9.



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All are factory-fresh, assured by prompt deliveries from the many Exide manufacturing and assembly plants located throughout the country.

Years of research-engineering are back of Exide Batteries. This development goes on and on, for Exide advances keep pace with current needs, providing batteries you can count on for dependable performance, long life and low cost per mile of operation.

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"Exide" *Reg. Trade-mark U. S. Pat. Off.*

STARTING POWER
for light, medium or heavy-duty service

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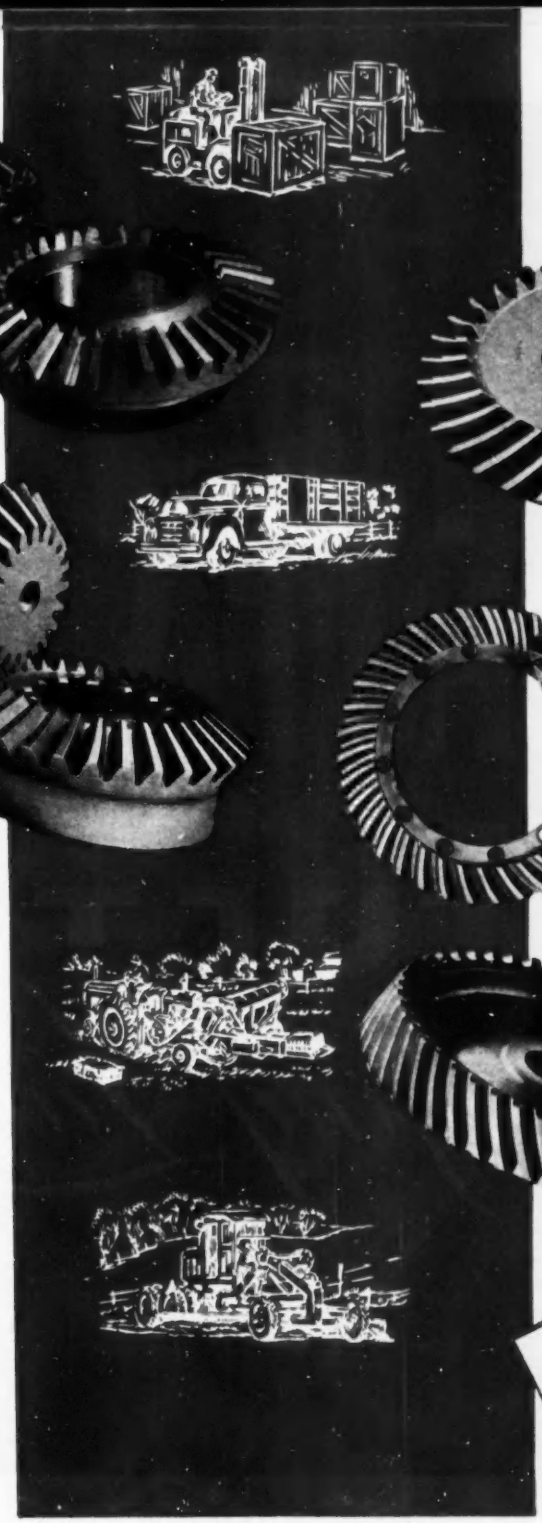

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While we've been known as Automotive Gear Works for almost forty years, we have grown steadily in our volume of gears produced for a wide variety of general industrial uses. As a result, more than half of our current production serves industries other than automotive. Whatever your product, where you need gears of the types in which we specialize, call Automotive Gear Works. Write for our new gear handbook containing full information.

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FOR FARM EQUIPMENT, AUTOMOTIVE & GENERAL INDUSTRIAL APPLICATIONS

The completely new approach to contour turning is the New

NEW BRITAIN +GF+ *Copying Lathe*

Equally suitable for long or short runs with simplicity of operation . . . minimum set-up and change-over time . . . reduced handling and checking time . . . elimination of expensive tooling.

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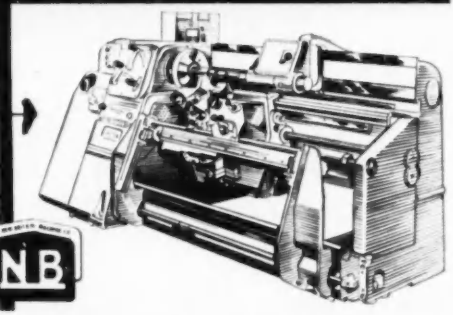

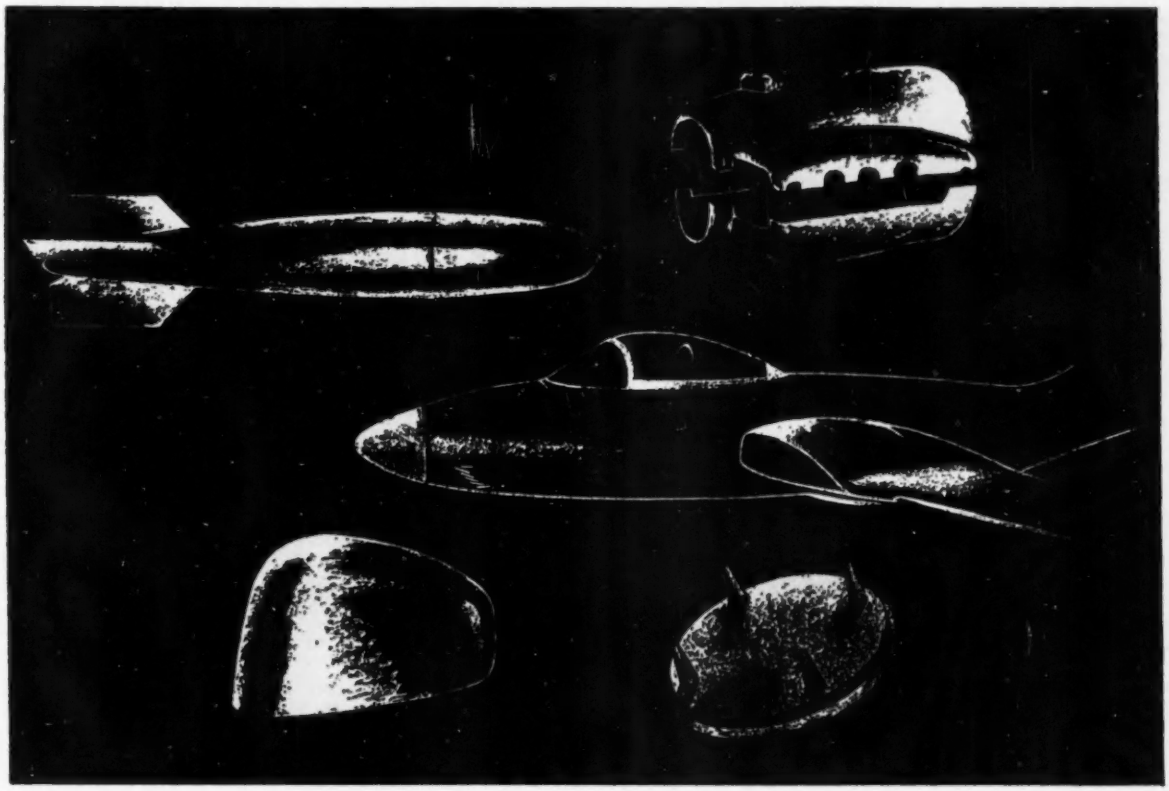

A SIGNIFICANT ADVANCE IN AIRCRAFT ENGINEERING...

POLYESTER REINFORCED PLASTICS—

Aircraft designers have found a new way to improve performance and reduce weight in many components formerly made of metal, thereby releasing metals for jobs only metals can do. They're specifying reinforced plastics made of glass fiber cloth or mat, bonded with BAKELITE Polyester Resins.

These new plastics have been employed for a variety of aircraft and marine applications, where a combination of great strength and low weight is necessary, and ease of fabrication is important. Fin tips, radomes, air intakes, flooring, and duct work are on the growing list of their applications.

Several different BAKELITE Polyester Resins, as well as grades of glass fiber cloth, are available to meet widely varying needs. For example, one type of reinforced plastic is produced from Owens-Corning "Fiberglas" cloth 181-136, laminated with BAKELITE Polyester Resin BRSQ-193, plus 10% monomeric styrene. The resulting laminate, when tested at standard conditions under U. S. Air Force Specification No. 12049, provides these physical properties:

Ultimate Strength, Flexural, Flatwise	**63,400 psi**
Ultimate Strength, Tensile	**47,400 psi**
Ultimate Strength, Compressive, Edgewise	**39,700 psi**
Impact Strength, Edgewise, Notched Izod, in. notch	**20.53 ft. lb.**

All of these values greatly exceed the requirements of the specification. Yet, the specific gravity of this reinforced plastic, which contains about 36 to 38 per cent resin, is only 1.8.

Reinforced plastics made with BAKELITE Polyester Resins have excellent electrical characteristics, including electrical "transparency" for radar housings. They are all within the Air Force flammability requirements. They are also highly resistant to such chemicals as hydraulic oil, isopropanol, ethylene glycol, and fluid hydrocarbon, Type II. Details on these and other valuable properties of reinforced plastics are included in booklet H-16, "BAKELITE Polyester Resins for Reinforced Plastics." Write Dept. EC-59.

BAKELITE
TRADE-MARK
POLYESTER RESINS

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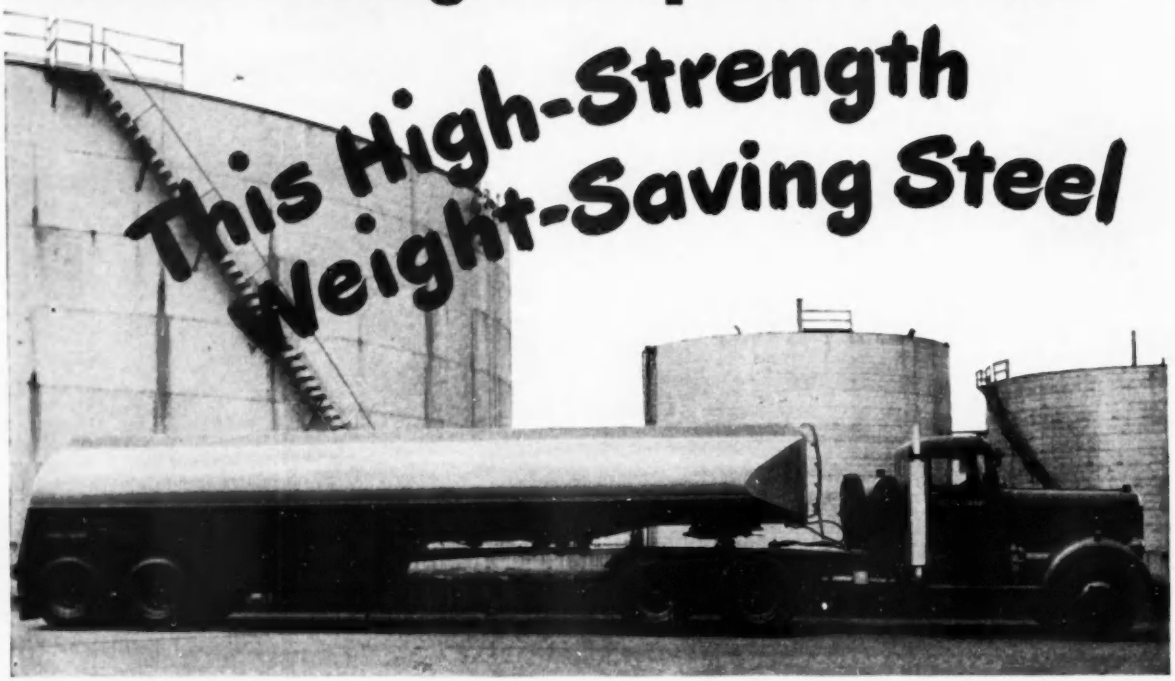
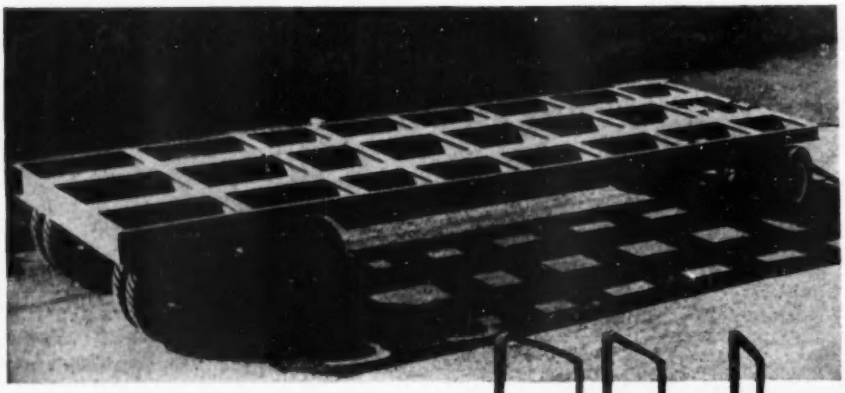
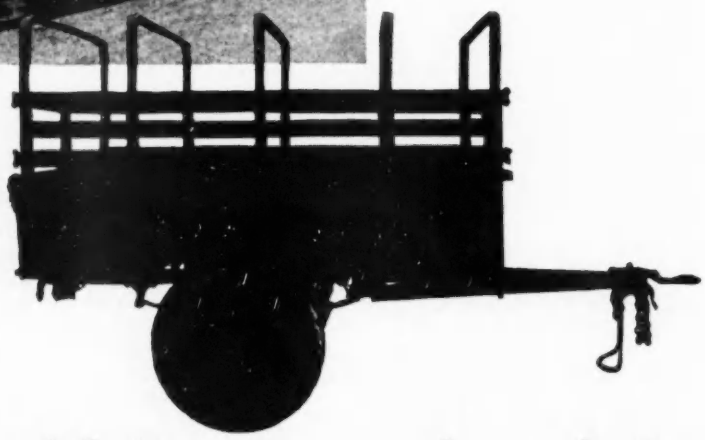
Trailer Designs Improved with This High-Strength Weight-Saving Steel



Almost one ton of deadweight is eliminated from this 7000-gal oil tanker by the use of light-gage Mayari R steel. A considerable increase in payload is made without exceeding the legal axle-load limit. Clough Equipment Service of Seattle, Wash., are the builders.



A special 60-ton capacity, heavy-duty trailer designed to carry large machinery in a scrap-recovery plant. All of the principal members are of low-alloy, high-strength Mayari R. The use of this steel increases the strength of the vehicle without adding to its deadweight. The builders are Rogers Brothers Corporation, of Albion, Pa.



This lightweight two-wheel trailer is designed to be airborne. The use of Mayari R keeps the deadweight to the minimum, yet provides adequate strength for rugged cross-country hauling. The trailer was built by Linn Coach and Truck Division of Great American Industries, Inc., Oneonta, N.Y.

BETHLEHEM STEEL COMPANY

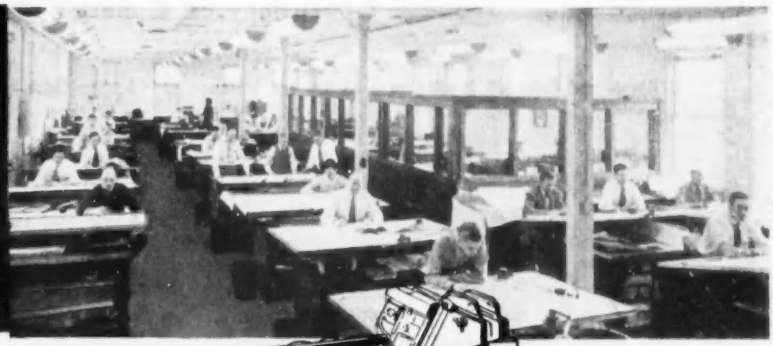
BETHLEHEM, PA.

BETHLEHEM STEEL

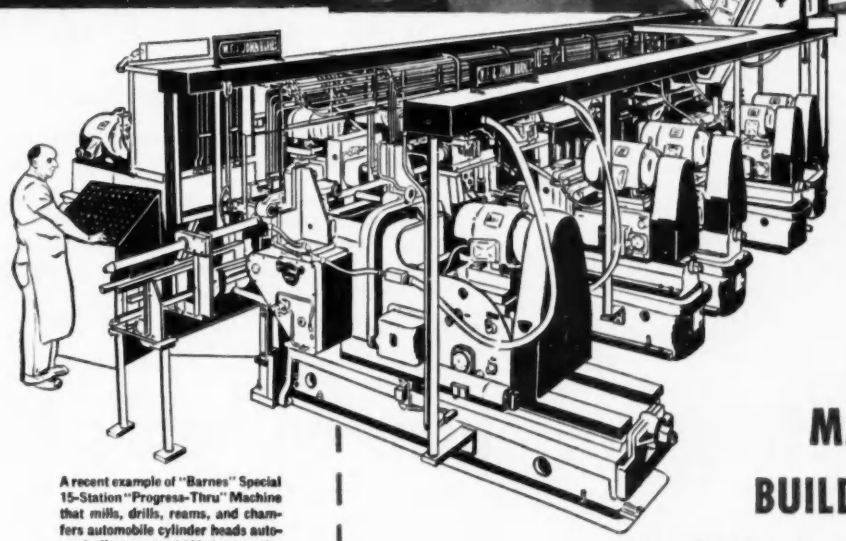
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mayari R *makes it lighter... stronger... longer lasting*

COORDINATED DESIGN and ENGINEERING important creative factor of a . . .



Partial view of Special Machine Engineering Department at Barnes.



A recent example of "Barnes" Special 15-Station "Progress-Thru" Machine that mills, drills, reams, and chamfers automobile cylinder heads automatically at a rate of 120 pieces per hr.

6-POINT MACHINE TOOL BUILDING SERVICE by W. F. & JOHN BARNES

BARNES SPECIAL MACHINE TOOL BUILDING SERVICE INCLUDES . . .

1. SPECIALIZED MANUFACTURING FACILITIES — 75 year background, large well equipped plant efficiently tooled to produce high production machines.
2. SPECIAL HYDRAULIC EQUIPMENT — designed and built to meet JIC standards. Individually engineered units assure smooth, dependable actuation for every requirement.
3. SPECIAL GAUGES, FIXTURES, TOOLS — designed for each individual machining problem, assure accuracy of operations at high production speeds.
4. SPECIAL ELECTRICAL EQUIPMENT and CONTROLS — individually designed and built for maximum safety and ease of control with circuits that assure the most dependable coordination of all machine functions.
5. SPECIAL HANDLING AND CONVEYOR EQUIPMENT — designed and built to reduce work handling, effect maximum safety and efficiency.
6. COORDINATED DESIGN AND ENGINEERING — as briefly outlined.

Group Planning Saves Time and Trouble

The creative and engineering skills of Barnes people today encompass a much broader field of industrial activity than ever before in the company's 75 year history. Thoroughly experienced mechanical, hydraulic, electrical, process, tool and fixture engineers work together toward a common goal. As a result you get the benefit of a coordinated effort that saves time and trouble. Interchange of ideas insures constant progress in developing new and better methods for increasing productivity and lowering costs.

Undivided Responsibility Improves Results

In addition, because all planning, engineering, and manufacturing efforts at Barnes are closely coordinated, you get a complete machine tool building service all from one convenient, dependable source. Experience gained over the years enables Barnes Engineers to help you solve complex machining and production problems quickly. When your present or future machining needs call for faster, more efficient methods, it will pay you to call on Barnes for recommendations. No obligation.

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MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES

Operations on Cylinder Block

1. Rough- and finish-mill locating pads on top and bottom; rough- and finish-mill bearing cap seats; mill bearing channel; rough- and finish-mill and broach bearing cap locks; drill, chamfer, and ream two locating holes in pan face—in a single setting in a 17-station Ingersoll transfer machine.
2. Rough-bore cylinder bores; rough-counterbore cylinder bores; and rough- and finish-mill the ends. This is done in a combination of a Moline four-spindle hydraulic rail feed boring machine and a special Motch & Merryweather through-type milling machine tied together to form a seven-station transfer machine.
3. Straddle-mill bearing ends, mill notches, rough-bore cam- and crank-bores, and bore gear hole—in a seven-station Ingersoll transfer machine.
4. Drill, chamfer, ream, and tap holes in front and rear ends, and drill through oil gallery hole—in a 13-station Baush transfer type drilling and tapping machine.
5. Drilling, tapping, chamfering, reaming, and milling operations on top and bottom faces—in a 22-station Cross Transfer-matic machine.
6. Semi-finish bore cylinder bores in a four-spindle Ingersoll machine.
7. Drill, chamfer, tap, ream, and spotface both sides of the block—in a 13-station Cross Transfer-matic machine.
8. Following assembly of bearing caps—semi-finish and finish-bore cam and crankshaft bores, together with related milling, boring, and reaming operations—in a seven-station Ingersoll transfer type machine.
9. Finish-bore four cylinder bores (3.6500-3.6510 in.) in a four-spindle Ex-Cell-O vertical type precision boring machine.
10. Broach top gasket face, removing 0.015 in. of stock, in a horizontal Oilgear surface broaching machine.
11. Finish counterbore for inserted sleeves in an Ingersoll boring machine.
12. Following the pressing-in of cylinder sleeves, the sleeves bores are finish-honed in a Barnesdril vertical honing machine fitted with a Micromatic four-spindle, hydraulically actuated honing fixture and tools. This equipment is served by a Barnesdril magnetic separator.

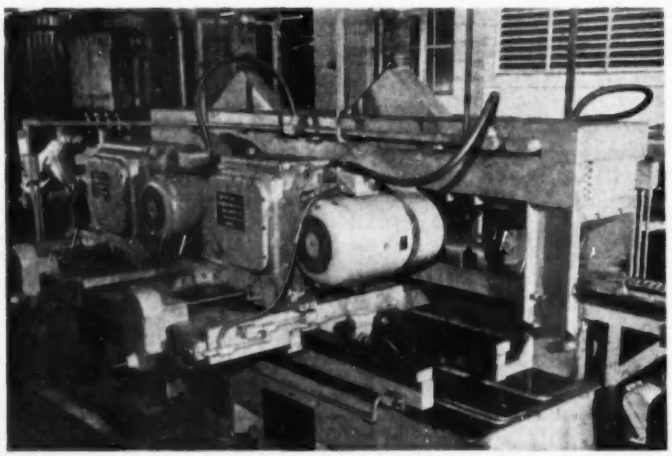
Outstanding Operations on Ford's New

By Joseph Geschelin

IN announcing its Golden Jubilee model Ford tractor recently Dearborn Motors Corp. introduced a newly developed four-cylinder overhead valve engine which is fitted with replaceable dry type cylinder sleeves. As in the past, the tractor and engine are manufactured at the Highland Park plant of Ford Motor Co.

Cylinder blocks and cylinder heads for this engine are machined in a fully automatic cycle on two parallel transfer machine lines comparable in modernity with latest passenger car practice. What is particularly noteworthy about these machine lines is their compactness. Space economy, an inherent characteristic of the modern transfer machine, makes it possible to conserve valuable floor area and reduce materials handling to the minimum.

Here is a special transfer machine composed of a four-spindle Moline boring machine for rough-boring cylinder bores; and a station type through milling machine built by Motch & Merryweather for rough- and finish-milling of the ends of the cylinder block. They form a seven-station transfer machine, operating on an automatic cycle.



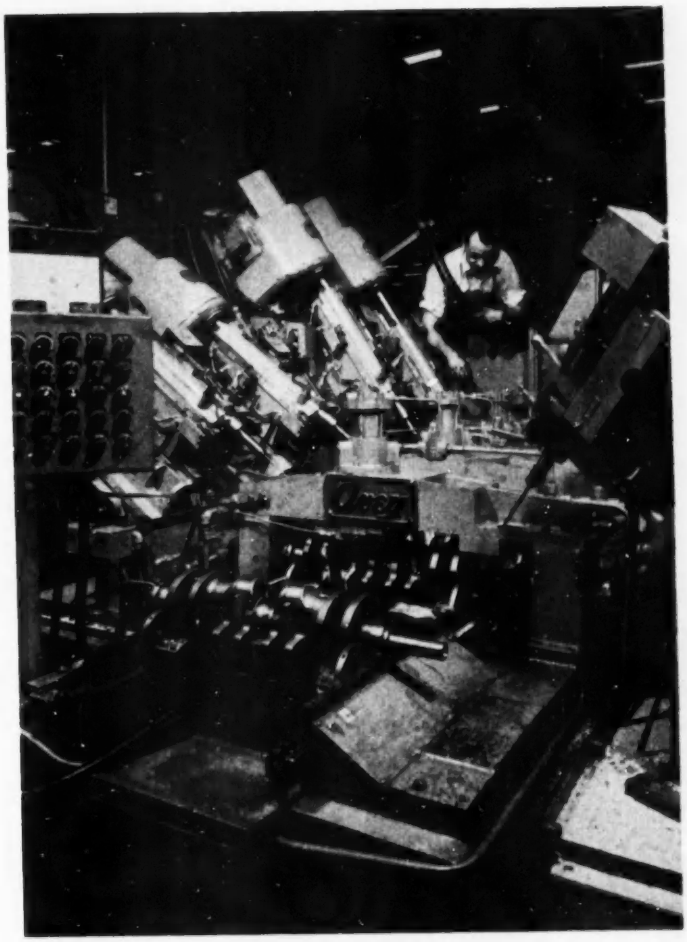
An impression of the layout of the two lines may be gained by referring to the sequence of operations for the cylinder head and for the cylinder block. The contrast from the standpoint of the number of operational stages is quite striking by comparison with conventional practice.

It may be noted that the sequence of operations on the cylinder head omits some of the hand operations, installation of valve seat inserts, washing, and inspection stages, in the interest of high-spotting. Also, all but the major machining operations have been omitted from the cylinder block sequence.

Operations on Cylinder Head

1. Mill- top, bottom manifold face, and front end in a seven-station Kearney & Trecker transfer milling machine.
2. Drill, chamfer, spotface, ream, and tap holes in top and bottom faces in a seven-station W. F. & John Barnes transfer drilling machine.
3. Drill, chamfer, spotface, ream, and tap holes in right- and left-hand sides, and rear and front end—in an 18-station W. F. & John Barnes transfer drilling machine.
4. Machine valve guide bushing holes, valve seats, and spring seats—in an Ex-Cello-O 12-station drilling and boring machine.
5. Finish-form intake and exhaust valve seats in an eight-spindle Moline hydraulic rail feed drill.
6. Grind valve seats.
7. Finish-grind contact (bottom) face in a Blanchard surface grinder.

Tractor Engine



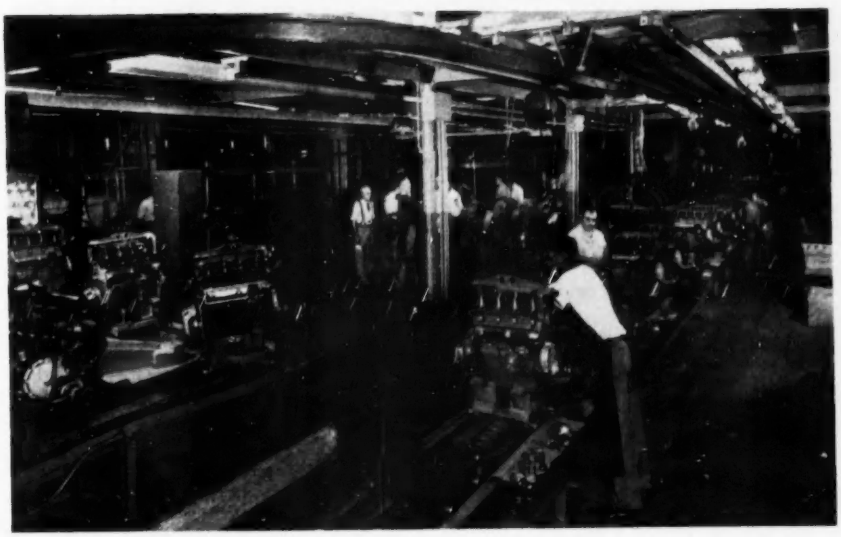
Interesting transfer type machine supplied by Avey for drilling all oil holes in the Ford crankshaft in an automatic and continuous cycle.

It will be noted that cylinder bores are given a rough-bore, semi-finish bore, and precision-bore in preparation for the fitting of cylinder sleeves. In addition, sleeve bores are finish-honed. The familiar Sheffield Precisionaire column type gages are used at various stages including inspection of bores after precision-boring and after honing, as well as after finish-boring of cam and crank lines.

Also noteworthy is the special attention that has been given to the fitting of mating surfaces of the cylinder block and head. As indicated in the lists of operations, the top face of the block is surface broached at the end of the line, while the contact face of the cylinder head is finished by surface grinding.

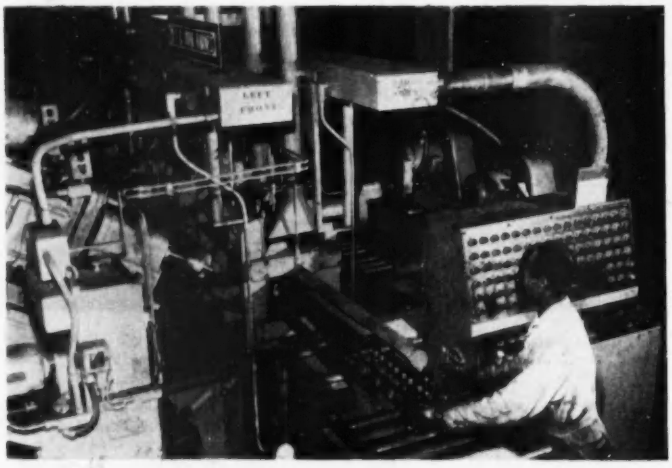
Following are more details on some selected

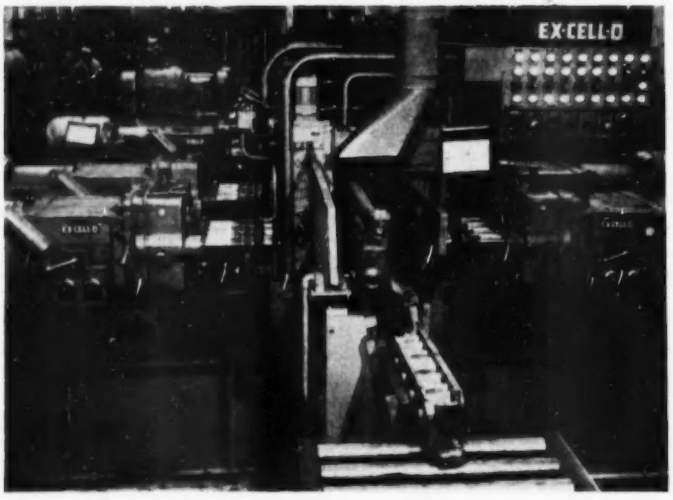
Ford tractor engines nearing the end of final assembly in the foreground. At the left is the transfer conveyor which transports engines to the "hot" test area in the right background.



Drilling, tapping, chamfering, reaming, and milling operations on the cylinder block are handled in the 22-station Cross Transfer-Matic shown here. The roll-over fixture in the immediate foreground, at the right, turns the block on its side to facilitate these operations. A 13-station Cross transfer machine for drilling, tapping, reaming, and spotfacing of holes on the sides of the block is installed further down on this line.

This is the loading station of the 18-station W. F. & John Barnes transfer machine tooled for drilling, chamfering, reaming, and tapping holes in the cylinder head—in both sides and both ends. Preceding this operation to the right out of this view, is a seven-station W. F. & John Barnes transfer machine which performs similar operations on the top and bottom faces.

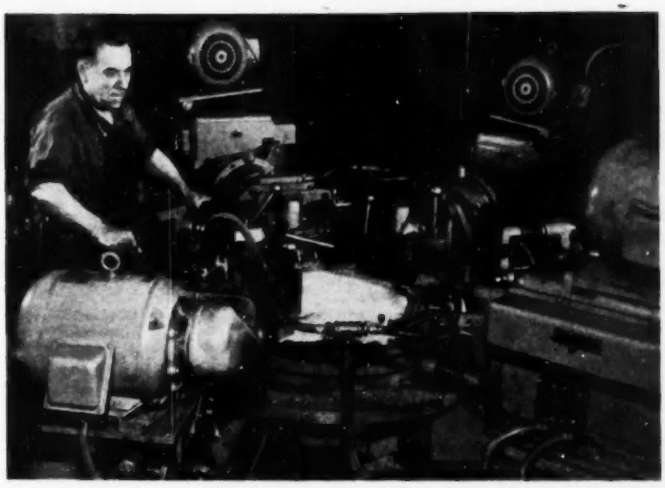




items of transfer equipment. On the cylinder head, the seven-station W. F. & John Barnes drilling and tapping machine (item 2 on the routing) has a total of 51 spindles in action. It has four working stations. Similarly, the 18-station W. F. & John Barnes drilling and tapping machine has a total of 66 spindles in action; and eleven working stations. The 12-station Ex-Cell-O transfer type drilling and boring machine (item 4 on the routing) has a total of 48 spindles in action; and seven working stations. All of the holes and bores produced in this machine are checked with a variety of Sheffield Precisionaire column type gages.

Looking at the cylinder block line, the 13-station Baush transfer machine (item 4 on the routing) has a total of 117 spindles in action, with long drills for progressively drilling the oil gallery hole. It has nine working stations. The Cross 23-station Transfer-matic (item 5) boasts a total of 188 spindles combined into 13 multiple spindle heads and four single spindle heads. This machine has 15 working stations.

Twelve-station Ex-Cell-O transfer machine on the cylinder head line, tooled for drilling and boring for valve guides, for valve seat inserts, valve seats, and valve spring seats, completing these operations in an automatic cycle.

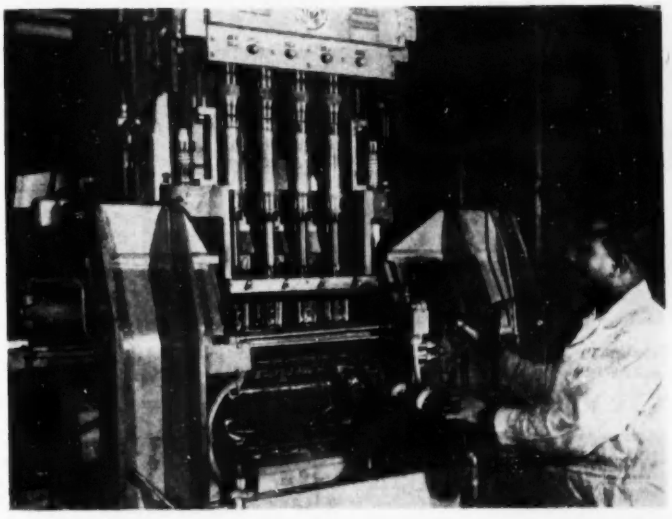


Here is an arrangement of LeMaire Twin-Ram drilling heads for drilling oil transfer holes in hydraulic lift cylinders and valve bodies for the new engine. This machine was built by Turner Bros. about the Turner indexing table.

Machining of cylinder block sides (item 7) is done in the 14-station Cross Transfer-matic, fitted with 69 spindles. It has a total of eight working stations. Maintenance of both Cross machines is facilitated by the now familiar Cross Tool-O-Matic board containing preset tools for each spindle ready for installation; and calibrated tool life controls for each machine head.

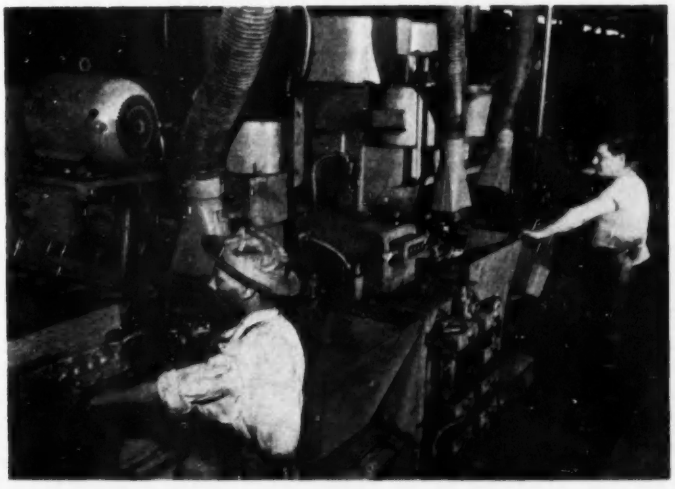
The simplicity and compactness of this machine shop, with its consequent smooth flow of operations and economy of manual effort, are by no means accidental. This implies a high degree of cooperation between engineering and manufacturing departments because conscious advance planning of product design is required to permit the proper allocation of operations to each of the specialized machines.

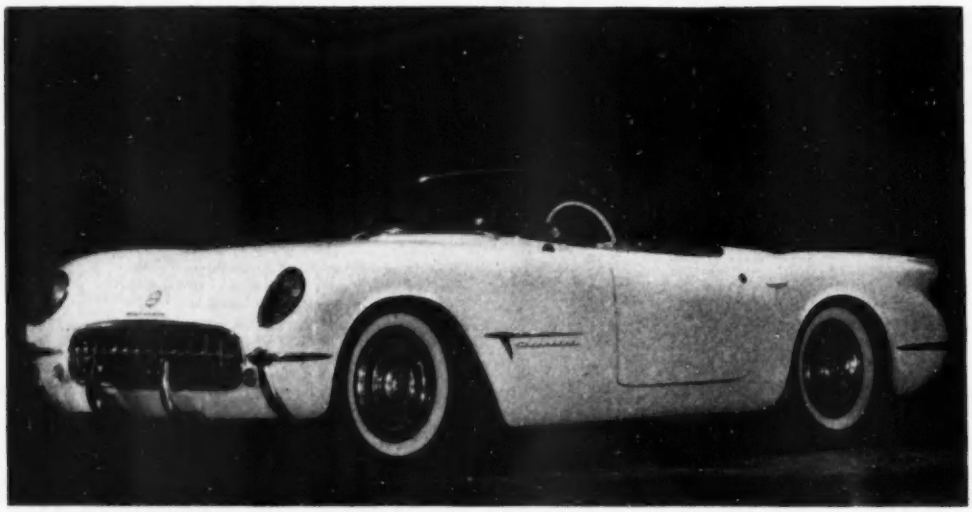
It is of interest that departments for other components such as pistons, connecting rods, camshafts, and crankshafts have been reorganized and tooled with the most modern equipment available for the purpose. It is noteworthy that crankshafts for the tractor engine, like those for passenger car engines, are made of castings produced by the precision molding method. This technique is distinguished by its ability to hold dimensions to extremely close tolerances, thus reducing materially the amount of metal to be removed by machining. As a result of this, considerably less equipment is required in setting up a new operation. This factor is evident from the compactness of the new tractor crankshaft machining department.



Cylinder bores are honed in this Barnesdril honing machine, fitted with a four-spindle Micromatic honing fixture and suitable tools. This operation was preceded by precision-boring of cylinder bores in a special Ex-Cell-O four-spindle vertical boring machine.

First operations on cylinder heads—milling of top and bottom faces, manifold face, and front end—are done in this seven-station Kearney & Trecker milling machine.

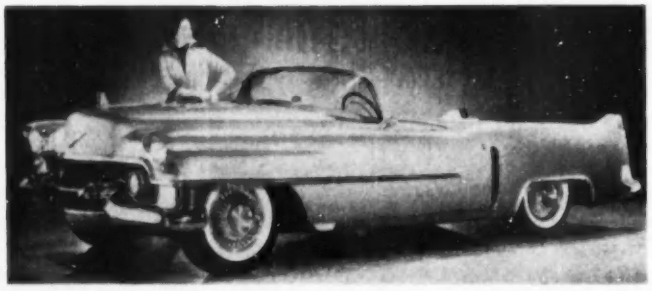




The Corvette molded-body car was introduced by Chevrolet. It is only 33 in. high on 102-in. wheelbase. Modified Powerglide engine has three carburetors, develops 160 hp. Screens protect headlights.

Oldsmobile's plastic Starfire has a 200 hp Rocket engine of 9 to 1 compression ratio. Five-passenger car has two leather bucket seats in front. Top disappears beneath rear deck.

Spotlight on at GM

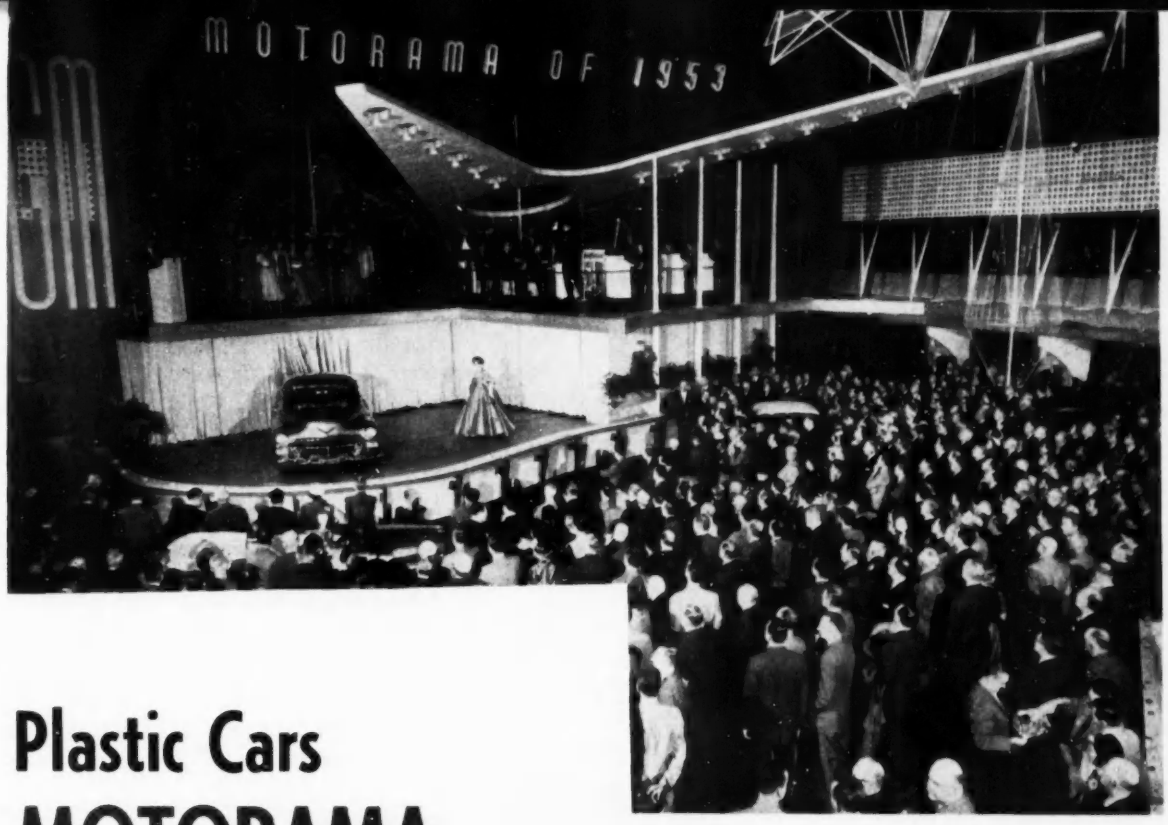


The Le Mans, Cadillac's latest glass fiber-reinforced plastic sports car, has a 250 hp engine of 9 to 1 compression ratio. The three-passenger car is 5½ in. lower and 24½ in. shorter than the standard convertible. Doors undercut the windshield.

GM's latest contributions to better motoring, displayed in highly dramatic fashion, were brought together for the first time at the General Motors Motorama of 1953. Parts of the show, held at the Waldorf-Astoria Hotel in New York City Jan. 17-23, are scheduled to appear around the country this year.

In addition to its production cars, each of the passenger car divisions sponsored special models designed by the GM styling section. Four sports cars with glass fiber-reinforced plastic bodies — the Corvette, Wildfire, Starfire and Le Mans—shown on these pages, " . . . might be called progress reports in plastic technology," according to C. A. Chayne, GM vice-president

La Parisienne landau by Pontiac has conventional metal body, standard engine, frenched headlights, and stands 56 in. high.



Plastic Cars MOTORAMA

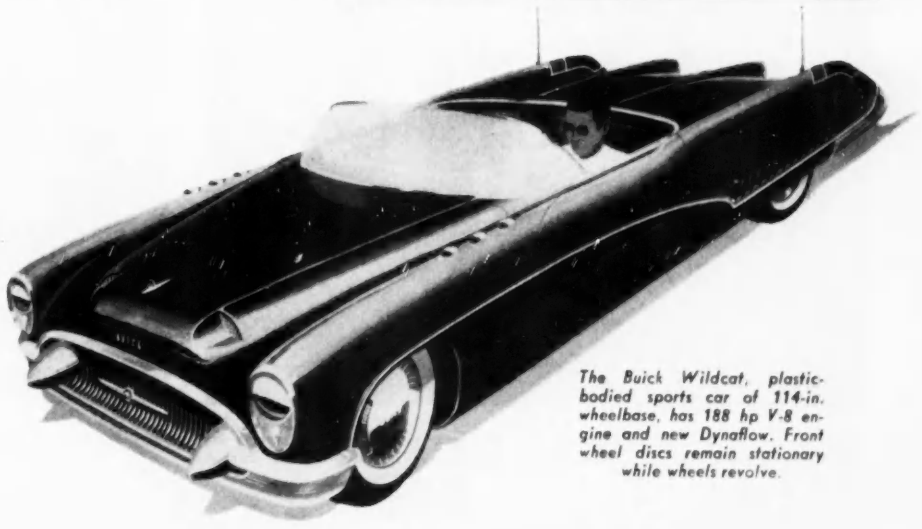
in charge of the Engineering Staff at Detroit.

He pointed out that work embraces several phases of automotive development. Fisher Body Engineering is specializing in dies and checking fixtures, largely in the field of cast plastics. This group is investigating application of new materials in its body building program.

Possibilities of plastic impregnated materials as substitutes for steel in body structures also are being studied by a special plastic development group in Engineering Staff at the GM Technical Center.

"We have installed electric ovens, mixing machines, vacuum frames and all the other specialized equipment to explore the great variety of materials now becoming available," said (*Turn to p. 120, please*)

GLASS REINFORCED PLASTIC
is Latest Material GM is Using to Experiment in Engineering, Styling, and Manufacturing



The Buick Wildcat, plastic-bodied sports car of 114-in. wheelbase, has 188 hp V-8 engine and new Dynaflow. Front wheel discs remain stationary while wheels revolve.

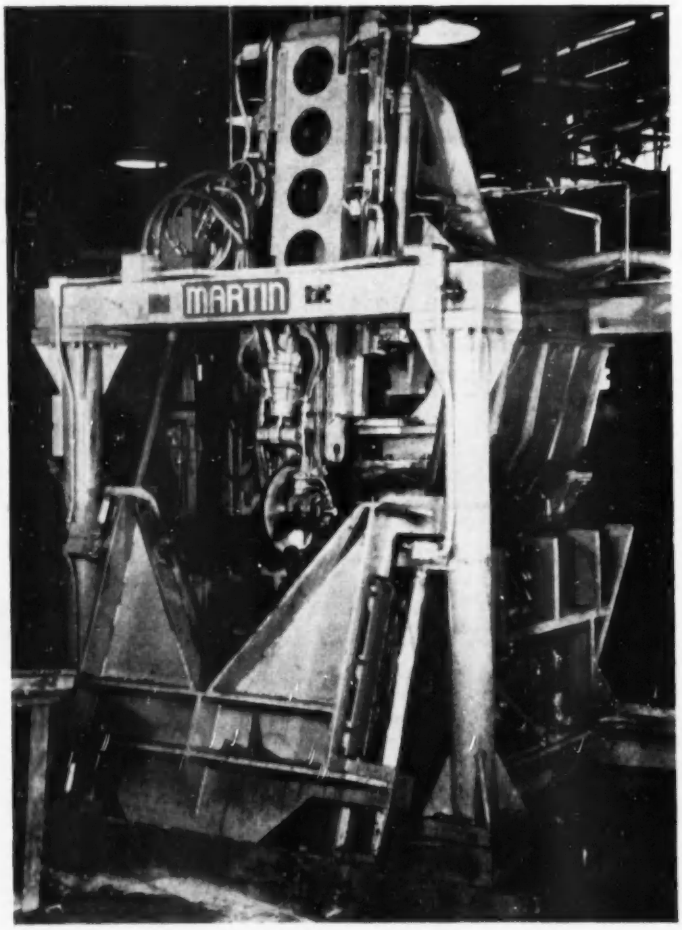
Pontiac's Newest Method for Making Front Fenders

Pontiac front fender in blank form. The upper end is the portion that is gathered and seam-welded.

SEVERAL years ago (see AUTOMOTIVE INDUSTRIES, October 15, 1949) Pontiac Motor Div., GMC, placed in operation what was then a revolutionary method for producing front fenders. Instead of the conventional deep drawing required to develop the nose section, Pontiac developed a method of gathering a suitably formed blank and welding the nose section in a special seam welder.

Since then production experience has led to still simpler means of doing the same job, using equipment of more modern design. For 1953 front fender production Pontiac has installed the special Martin gathering and welding machine, illustrated here. The flat blank also is shown separately to indicate its configuration for this purpose. The top end is the nose section which is gathered in the welder.

The appearance of the fender as it is completed in the welder is seen in the illustration below. It is particularly noteworthy that in this stage the fender has not required any of the usual press drawing operations. In fact, it is completed subsequently in a few simple press stages, primarily drawing to form and nosing.



This is the Martin special gathering machine and seam welder used for making the front fender stamping. The seam-welding wheel may be seen in the center.

Here is a view of the Pontiac front fender as it comes out of the Martin welder.

New Engine Developments at NATIONAL BOAT SHOW

THE 43rd National Motor Boat Show, held in New York City Jan. 9 to 17 under the sponsorship of the National Association of Engine and Boat Mfrs., crowded Grand Central Palace with 246 exhibitors of boats, engines and marine accessories. This was the largest number of exhibitors ever to participate in the Show. Among them 64 showed boats ranging in size up to a 55-ft cruiser. There were 25 inboard cruisers, 11 outboard cruisers, 35 sail boats, 20 inboard runabouts and more than 150 prams, dinghies and outboard runabouts—a record number of craft.

Among the new inboard engines was a four-cylinder, 450-lb unit displayed by Universal Motor Co. With 141 cu in. piston displacement, it develops 65 hp at 3400 rpm. Detroit Diesel Engine Division of General Motors Corp. showed the new two-stroke, loop scavenged Diesel described in AUTOMOTIVE INDUSTRIES Jan. 1. This four-cylinder, in-line engine has a piston displacement of 216 cu in. and develops 87 hp at 3000 rpm. Output with accessories is 80 hp at 2500 rpm. Another Diesel at the same booth was an adaptation of the 71 series with its cylinder block tilted 70 deg from the vertical. This construction permits a reduction in height of 9½ in Extensive use of aluminum results in a weight saving of about 500 lb. Both right and left hand rotation engines are available. Nordberg Manufacturing Co. featured a new 130-hp, six-cylinder gasoline engine with 4-in. bore, 4½-in. stroke and 320 cu in. piston displacement.

Diesel Energy Corp. brought three Deutz aircooled Diesel engines to the Show from Cologne, Germany. The largest was a V-eight which develops 100 brake horsepower at 1500 rpm. Two and three cylinder Deutz power plants, complete with gear boxes, also were shown. The smaller engine develops 25 hp while the larger one has an output of 37½ hp.

Introduction of more powerful models was the trend among outboard motor manufacturers displaying their wares at the Show. Refinements noted in 1953 motors are single speed controls, adaptation to extra fuel capacity and new design facilitating access to inner parts of the motors.

Five new outboard models were exhibited by Champion Motors Co. These "Jubilee Champion" motors ranged from five to 15 hp. Three of them were Jubilee gear shift models of five, 7.5 and 15 hp, while the other two were Jubilee Hydro-drive types of 7.5 and 15 hp. Common to all five new models are newly-engineered powerheads and "4-in-hand" control. All have been completely redesigned. Other features include rubber mountings, separate cruising gas tanks, EZ-Off hoods, swing-in-to-boat lower units, double carrying handles, automatic rewind starter plus extra flywheel starters. The display of Evinrude Motors included the 15-hp Super Fastwin, Evinrude's latest model. This alternate-firing, twin cylinder unit has Roto-Matic speed control with ignition and throttle synchronized in a single control on the handle, and an "Auto-Lift" hood which enables the operator to open the motor for routine inspection by unsnapping two clasps. The motor comes equipped with a separate six-gal fuel tank.

A Model 200 Silver Streak was shown for the first time by Martin Motors. It weighs 70 lb and develops 20 hp. It features a built-in fuel tank with gage and an optional six-gal auxiliary tank, twist grip speed control in steering handle, a three-way fuel regulator and a specially-designed torpedo lower unit. Two "Gold Pennant" outboard motors were the latest development of Scott-Atwater Mfg. Co. The new models have a separate six-gal fuel tank, neutral and reverse shift control, automatic fuel pump, drop-pawl starter and cushioned as standard equipment.

A definite boom in small cabin cruisers, powered with outboard motors, was reflected by the number of new builders of this type of craft who exhibited their boats.

Eleven boat builders showed outboard cabin cruisers this year ranging in size from a 16-footer to a 21-ft model. They all have sleeping accommodations for two provided for in a cabin, plus toilet facilities and a galley. Some of these cruisers are plywood-hulled; others are planked in lap-straking or smooth-planking. One has an aluminum hull; another a molded-plywood hull. All offer reasonable cruising accommodations.

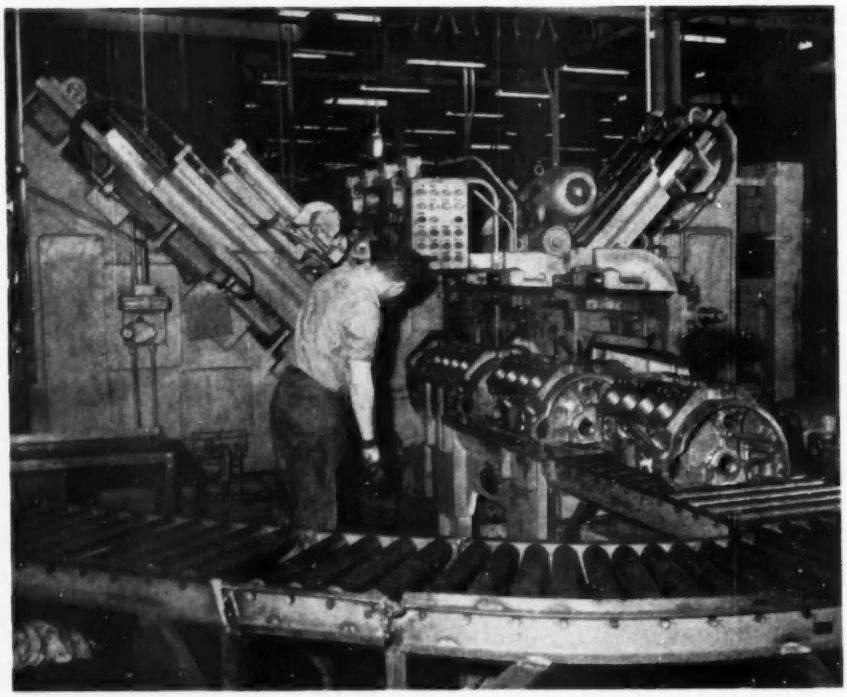
Among the five newcomers to this field is Alma Craft Boat Co., Minneapolis, Minn., with a 19-ft all-aluminum outboard cruiser. This craft, equipped with buoyancy tanks to make it virtually non-sinkable, is of round-bottom design featuring a tunnel stern for protection of rudder and propeller. Speeds of up to 20 mph are claimed with a 25 hp outboard motor.

Another new one is the Wagemaker-built Albatross 20, shown by Port Washington Marine Sales & Service,

(*Turn to page* 110, *please*)

By Joseph Geschelin

BUICK'S New



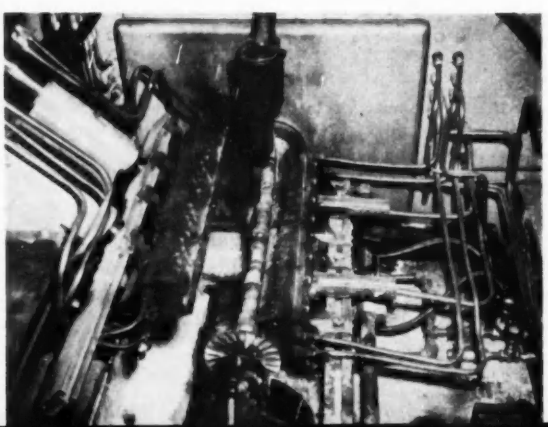
Ex-Cell-O, V-type precision boring machine which does the boring of V-8 cylinders in preparation for rough- and finish-honing. A unique feature of the boring heads is an arrangement for holding all bores in a given block to the same size.

WITH the introduction of its distinctive line of V-8 engines for Roadmaster and Super models, Buick Motor Div., GMC, has placed in operation a new self-contained engine plant located north of Flint proper. With a floor space of 880,000 sq ft, the new facility will become one of the largest engine plants in the industry when the entire tooling program is completed about mid-1953.

At the present writing some major items of equipment are in progress of installation with more equipment moving in during the course of the next few months. Meanwhile, production has been established on Roadmaster and Super engines, employing temporary setups here and there to tide over until the new machinery has been installed. In view of this, the present article is concerned primarily with a high-spotting of unique or interesting items of equipment, presenting a perspective of selected activities.

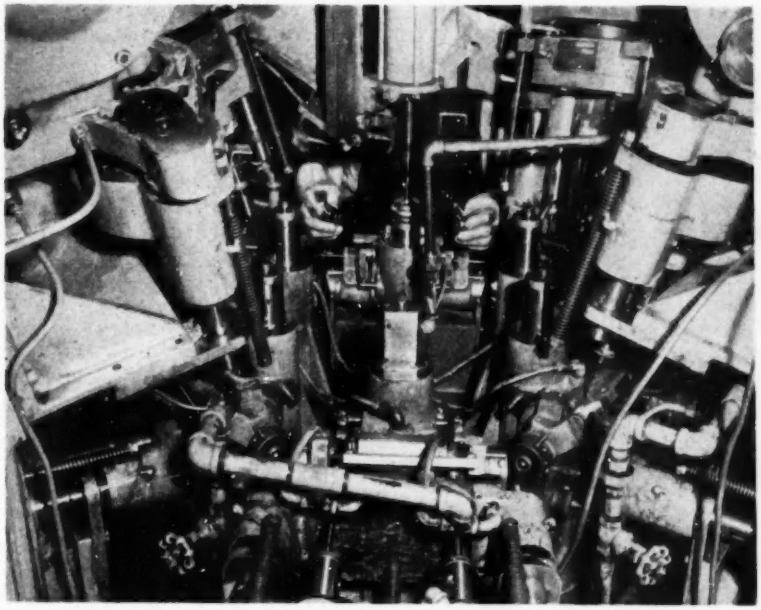
As one studies the development of this plant it becomes obvious that it represents outstanding features of advance planning characteristic of automotive mass production as it is practiced today. We refer specifically to the advance planning of a product design program related intimately with the work of the master mechanics department and plant layout. For one thing, the massive and expensive transfer machine lines, some of which will be discussed later, are highly specialized and not easily changed to suit different product designs. Once such equipment has been installed, it must serve for a long period of years.

The current engine program includes a V-8 for Roadmaster and Super, both engines being alike in major detail insofar as the foundry and machine shop are concerned. However, the long range program must



Closeup of work station of Cincinnati Flamatic designed for hardening of cams and bearings on V-8 engine camshafts.

Self-Contained PLANT
for Producing V-8 Engines



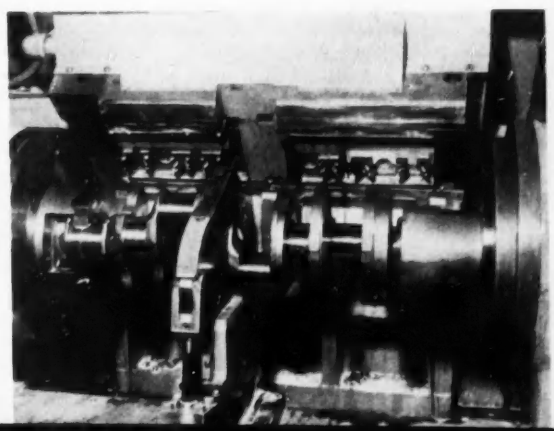
Closeup of one of the multiple-head Kingsbury automatic drilling machines for drilling the oil holes in V-8 engine rocker arms. Two piece are loaded at each station.

look far beyond this stage. Eventually, Buick will have a V-8 for its Special line as well, and problems of interchangeability and compatibility with equipment now being placed in operation had to be considered at the very beginnings of the program. This plant will be capable of producing almost one-million engines a year when completely tooled.

As will be developed in a later article, the machine shops have enormous transfer machines supplied by familiar names such as W. F. & John Barnes, Greenlee, Snyder, Footburt, Moline, Ingersoll, and Ex-Cell-O. In its postwar program Buick was perhaps the first, certainly one of the first, to introduce the enormous Cincinnati three-station surface broaching machine for finishing all faces of cylinder heads for Super and Special engines. A newer, larger, and more advanced version of this machine has been installed for machining wedge-shaped cylinder heads for the new engines.

Very shortly the cylinder block line will be equipped with a huge Cincinnati surface broaching machine which will handle in one setting the finishing of the two banks, the crankcase gasket surface, and main bearing lock line. Now in process of installation is a big Moline transfer machine on the cylinder block line.

Although the crankshaft is machined by familiar methods, using equipment of latest type, it has one distinctive feature that marks a first in passenger car production. We refer to cam-turning of counterweights. As described in connection with the Buick engine announcement (see AUTOMOTIVE INDUSTRIES,

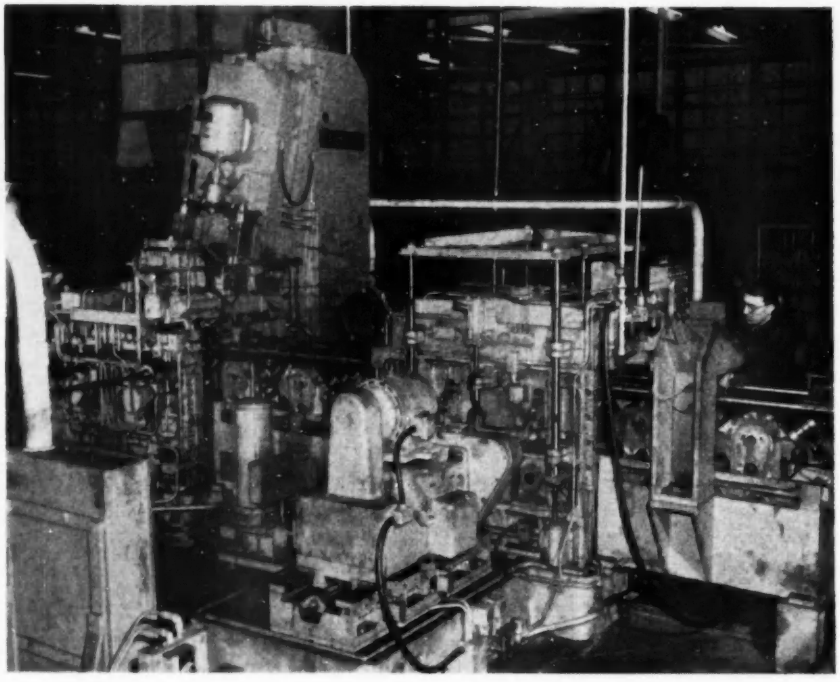


A unique method of cam-turning V-8 crankshaft counterweights has been developed by Jackson Crankshaft Machine Co. This machine, an adaptation of the company's crankshaft turning machine, cam-turns the periphery of counterweights and chamfers the sides. The chamfering tools may be seen in the tool block immediately above the work station.

January 1, 1953) this is done to effect uncommon compactness by providing adequate clearance with the piston skirts, permitting at the same time use of a full piston skirt.

Cam turning is done in a new crankshaft turning machine developed by the Jackson Crankshaft Machine Co. As illustrated, the crankshaft is held between centers and supported at the center main bearing. On each side of the center support are tool blocks holding three tools at the lower end for cam-turning, and three sets of chamfering tools at the top. The latter come into play as the turning tools complete their cycle.

Cincinnati Flamatic equipment for selective hardening and quenching in the same cycle has hit its stride in applications in this plant. The largest units are those installed in the camshaft department for hardening all cams and bearing surface simultaneously. Contrasted with the former method of heat treating, which included copper-plating for masking, the Flamatic technique has served to simplify operations, reduce the amount of equipment required for this purpose and thereby effect considerable compactness of the department. It has improved quality as well. In addition, the new setup reduces materials handling considerably and speeds productivity.



Here is a view of the compact transfer machine supplied by Ex-Cell-O for precision-boring the main bearing line, the cam line, and distributor bore. Each of the two stations is of double-index type, holding two blocks. The vertical angular unit for boring the distributor hole may be seen at the left.

The camshaft gear is cut in a battery of six-spindle, Lees-Bradner gear hobbers. The same gear is shaved in a battery of National Broach Red Ring shavers.

Cincinnati Flamatic equipment also is installed for hardening both ends of the new pushrod. Here the unit is fitted with a cylindrical type fixture on which the rods are mounted. Rocker arms are made in rights and lefts, both ends being selectively hardened in this special setup. The two fine oil holes in each rocker arm are drilled in successive step-by-step drilling operations in Kingsbury multiple-spindle drilling machines, having nine heads as illustrated. The indexing fixture in this machine holds two rocker arms at each station.

Some time ago Buick made one of the earliest installations of the Micromatic Turret Hone for finish-honing connecting rod big ends. A battery of improved machines of this type now is installed in the new plant. Of six-station type, these Turret Hone machines hold the connecting rod big end hole to a tolerance of 0.0005 in. on the diameter, and for straightness and out-of-round.

Ex-Cell-O has supplied some noteworthy items of equipment on the cylinder block line. One of these, as illustrated, is a compact transfer machine for precision-boring the main bearing line at one station, and precision-boring the cam bearing line and distributor bore at the second station. Both stations are of double-index type, and handle two blocks at a time. The main bearing line is held to a tolerance of 0.0005 in., while the cam bearing line is held to plus or minus 0.001 in.

V-type Ex-Cell-O precision-boring machines, of double-index type, are used for precision-boring cylinder bores before honing. A unique feature of these machines in that the boring tools are designed to hold uniform size for a given set of bores. In effect, while the bore diameter may vary between established limits on preliminary boring operations, precision-boring will effect uniform bore size for any given block.

It has been a practice of long standing at Buick to double-hone cylinder bores. To this end, Buick has a large installation of Barnesdril V-type honing ma-

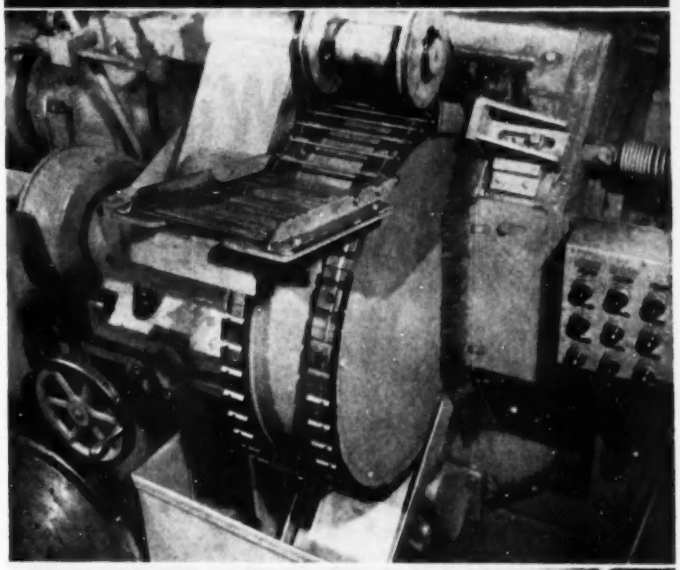
Push rods are formed directly from steel wire in the equipment seen here. Wire is fed to the Ajax-Hogue wire drawer in the foreground where the wire is straightened, cut off, and fed to the Waterbury-Farrell cold header at the left. The cold header gathers the spherical ends of the push rod.

chines, fitted with Micromatic honing fixtures and tools; one group for rough-honing (with some metal removal), the other for finish-honing.

Cylinder bores are graded in a series of 10 sizes, in steps varying by 0.0003 in. Grading of bores is done in a battery of two large column-type Sheffield Precisionaire gages. Each one takes four bores at a time. The columns are calibrated in steps numbered from one to ten and these readings determine the marking of the grade for each bore by the operator. These gages are substantially of the same type that Buick installed in the old engine plant several years ago.

It is obvious that grading in ten steps is determined largely by variations in bore expected in a fast moving operation of this kind. Nevertheless,

This view of the special Besly double-end grinder shows the method of loading V-8 engine push rods in the fixture for grinding to length.



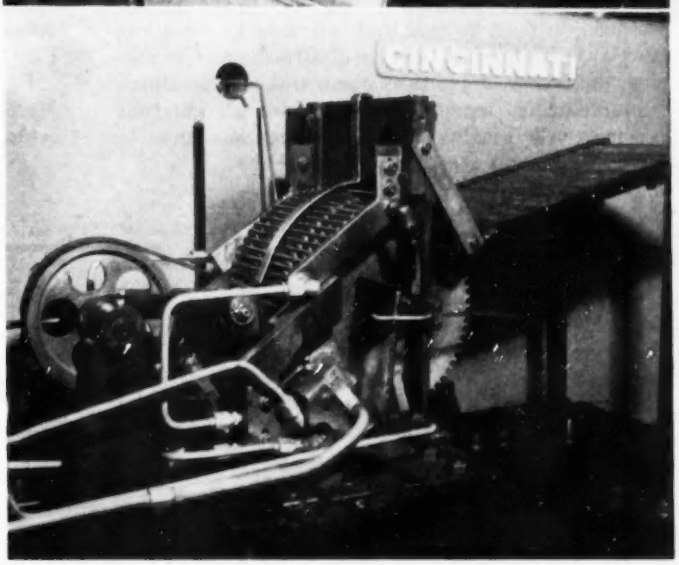
the process is subject to such close control that at least 85 per cent of all bores usually will fall within three median size limits, usually 3, 4, and 5. This is desirable, naturally, in the interest of limiting piston variations, which can be held to much closer limits.

Pushrods for the new V-8's are made in one piece from steel wire on the equipment illustrated here. The wire, in coils, is fed to the first station, an Ajax-Hogue wire drawer which straightens the wire, cuts off to length, and feeds the pieces to the Waterbury-Farrell cold header. The latter produces the spherical ends.

Work is then transferred to the special double-end Besly grinder where the pushrod is surface-ground to correct length by removing stock from the tip of each end. Next operation is hardening of both ends in the Cincinnati

(*Turn to page* 114, *please*)

Spherical ends of push rods are hardened automatically in a large Cincinnati Flamatic machine. This is a closeup of the work station, showing the drum type fixture for holding a large number of pieces, loading and unloading automatically.



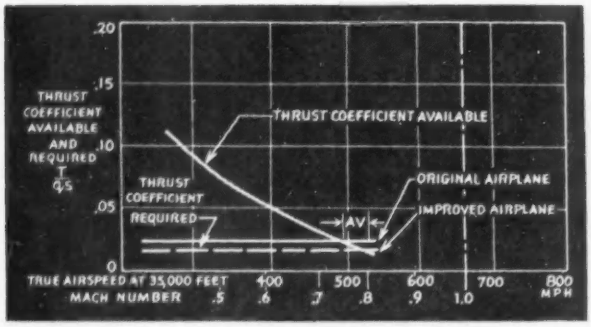


Fig. 1. Speed gain by reducing low-speed drag

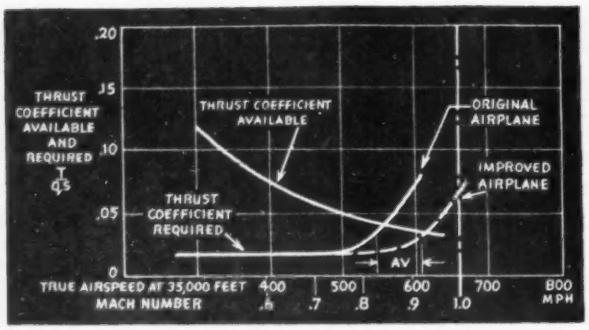


Fig. 2. Speed gain by increasing critical mach number

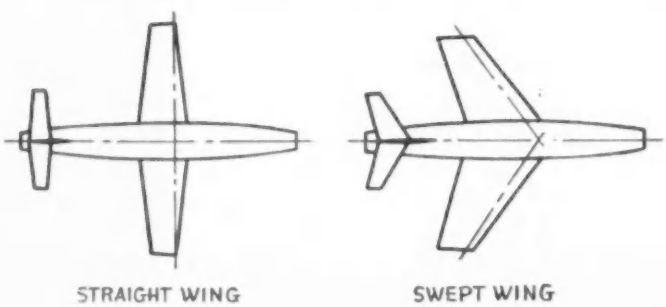
An Engineering Comparison of Wing Planforms for Supersonic Speeds

ALTHOUGH every aerodynamicist insists that wing planform is very important for airplanes designed to fly supersonically, examination of the geometric characteristics of currently proposed high-speed designs shows that there is a great deal of confusion on this subject. In fairness to the aerodynamicists it must be said that each may be correct in his planform choice if the type of airplane and its mission, limitations imposed by structural considerations, manufacturing, maintenance, etc., are all carefully considered in making the best design compromise. Thus for certain types of aircraft that must reach extremely high Mach numbers, a thin-straight-wing airplane configuration may be the most suitable. For slightly lower Mach numbers in short-range missions, a delta-type configuration may offer the most promise; and for the case where the supersonic Mach number is limited to 1.5 or less and long range is desired, a conventional swept-back-wing arrangement may be chosen.

Before comparing hypothetical airplanes of these types, it seems advisable to discuss, in general terms, the aerodynamic means available for reducing drag in the various speed ranges. Emphasis is placed on speed as the primary requirement of a fighter-type airplane, since a speed advantage is always necessary if an airplane of this type is to perform its basic mission effectively. For slower airplanes such as transports and light planes the main factor in determining the high speed is simply the parasite or ordinary low-speed drag as shown in Fig. 1.

For airplanes having high speeds slightly less than Mach number 1.0, the gains in performance can be achieved by increasing the airplane critical Mach

Fig. 9. Complete airplane planforms



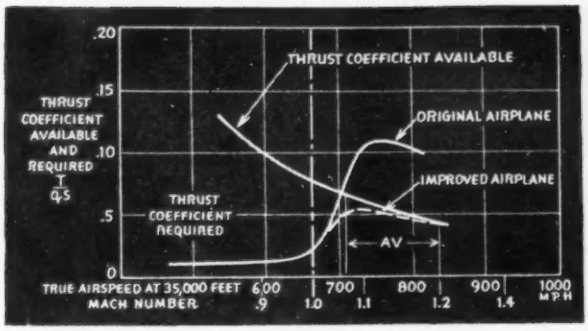


Fig. 3. Speed gain by lowering drag peak

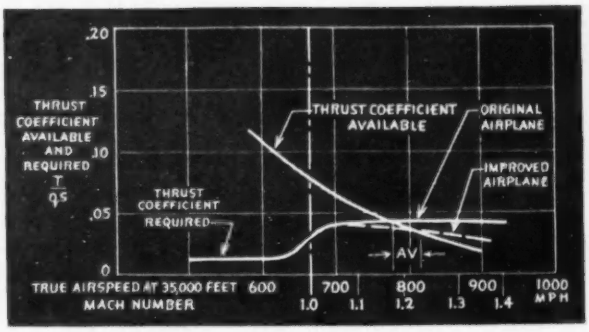


Fig. 4. Speed gain by variation of supersonic drag coefficient

By K. E. Van Every

Chief, Aerodynamics Section

Douglas Aircraft Co., Inc.

El Segundo Division

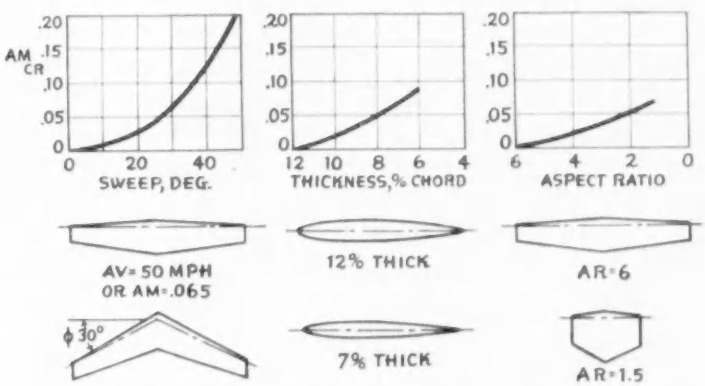


Fig. 5. Comparison of methods for increasing wing critical mach number

number, or more exactly, the Mach number at which the drag rise occurs. This is illustrated in Fig. 2. Even supersonic airplanes should have a high critical Mach number, since much of the time they must fly at subsonic speeds in order to make the most efficient use of their fuel.

If we set our sights somewhat higher and ask for supersonic level-flight speeds, it is then necessary to either

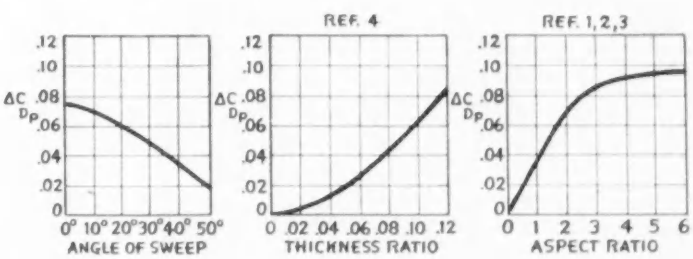
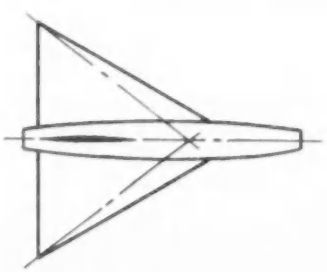


Fig. 6. Comparison of methods for lowering drag peak



DELTA WING

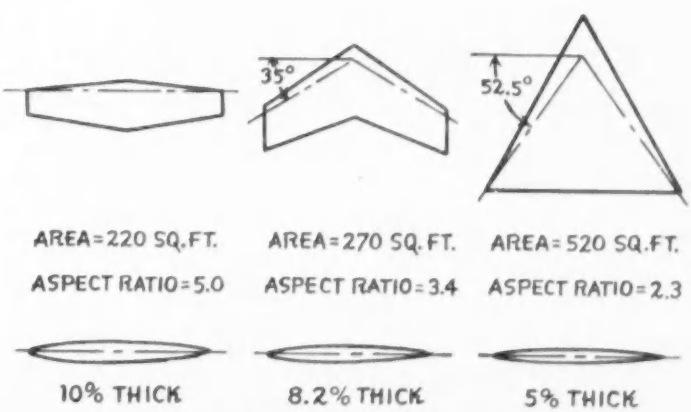


Fig. 7 Wing planform diagrams

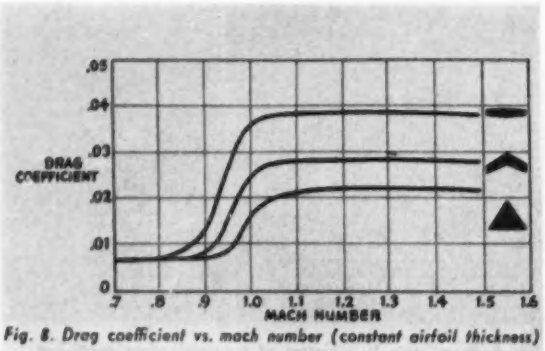


Fig. 8. Drag coefficient vs. mach number (constant airfoil thickness)

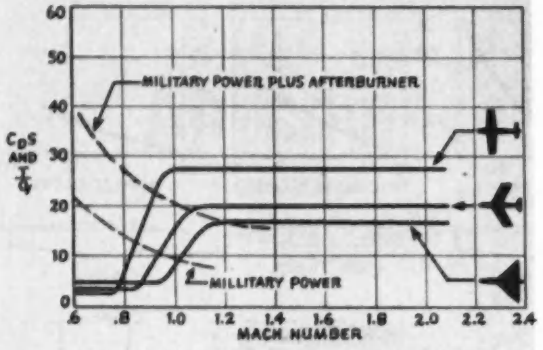


Fig. 10. Thrust available and thrust required

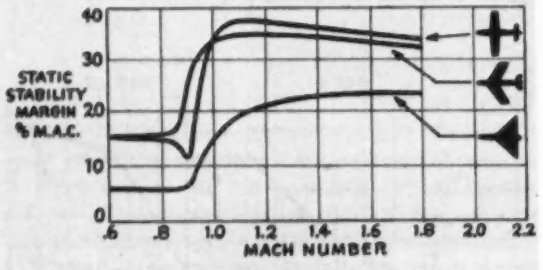


Fig. 11. Longitudinal stability characteristics vs. mach no.

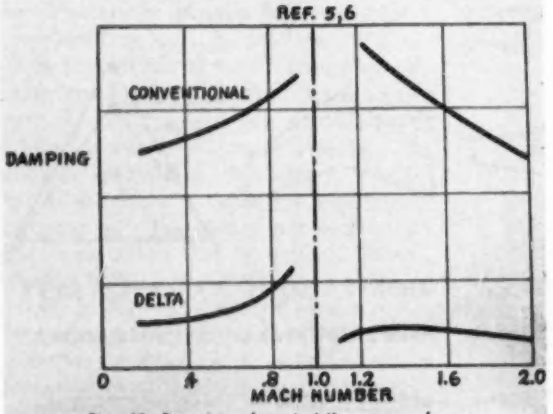


Fig. 12. Damping characteristics vs. mach no.

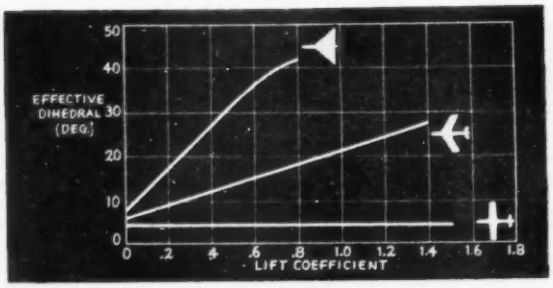


Fig. 13. Lateral stability characteristics

lower the peak drag coefficient, which occurs near Mach number 1.0, or to obtain increased engine thrust. Obviously, there is a limit to engine size, and it therefore becomes necessary to lower the peak drag. The increase in maximum speed that can be achieved by this means is shown in Fig. 3.

If extremely high supersonic speeds are desired, that is, greater than M = 1.2 the variation of drag coefficient with supersonic Mach number is the important consideration. This variation, shown in Fig. 4, is influenced by the type of planform and the airfoil section.

Thus, it is seen that for high-speed performance it is first of all necessary to devise an airplane configuration that will have the highest possible critical Mach number; second, if still higher performance is desired, the lowest peak drag coefficient; and third, if extremely high supersonic speeds are desired, decreasing drag coefficient in the supersonic region. Fortunately, the increase of airplane critical Mach number and lowering of airplane drag peak are achieved by the same three basic methods. These methods are illustrated in the next two figures. Fig. 5 shows that the critical Mach number may be increased by the use of sweep, thinner airfoils, and lower aspect ratios.

Other means for increasing airplane critical Mach number, which are not shown in this figure, are combining components, such as wing, fuselage, tail surfaces, canopy, etc., in an optimum manner and the use of boundary-layer control. The drag-peak variation with sweep, thickness ratio, and aspect ratio is shown in Fig. 6. In both figures, it is seen that sweepback and reduced thickness are very powerful means of changing the airplane high-speed characteristics. Low aspect ratio is directly beneficial to some extent, but as will be discussed later, its major importance is in making possible reduced airfoil thickness.

From this discussion it is apparent that an airplane designed to fly at high speeds can have widely different geometric characteristics, and it is only by considering all of the factors involved, including the operating-speed range, that the optimum airplane can be determined. In order to investigate briefly all the possibilities, three different, typical wing planforms have been selected and airplanes designed around them—all for the same basic mission and using consistent assumptions as to aerodynamic characteristics.

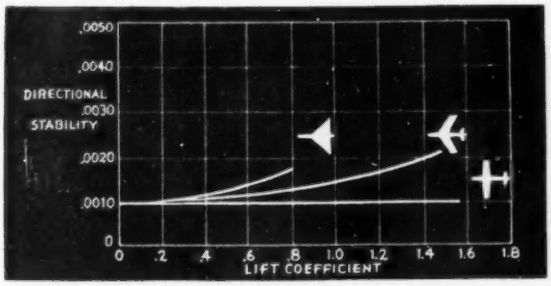


Fig. 14. Lateral stability characteristics

As a preliminary to discussion of complete airplane characteristics, it is well to consider the characteristics of typical wing planforms shown in Fig. 7.

Three types of planforms are considered—a straight wing, a sweptback wing, and a delta wing. The straight wing has an aspect ratio of 5, and the swept wing is derived from it by rotating the wing panels 35-deg. This results in an aspect ratio of 3.4. The delta-wing configuration is a true equilateral triangle, which has an aspect ratio of 2.3. The areas of the different planforms are adjusted so that all of the airplanes have approximately constant stalling speed of 100 knots if the airplane gross weights are constant at approximately 15,000 lb. Now assuming that thickness ratio and area are constant, the drag characteristics are as shown in Fig. 8.

These curves in Fig. 8 show that from a drag coefficient standpoint the delta wing is distinctly better than either of the other two planforms. It must be remembered, however, that if the airplanes are to have comparable stalling speeds and take-off distances the wing areas will be different. The straight wing will be smallest, the swept wing somewhat larger, and the delta wing will be nearly twice as large as the swept wing. Thus, if the product of drag coefficient and wing area is considered, the increased wing area will tend to cancel the advantages of the lowered drag coefficient. The problem, however, is complicated even more by the fact that it is possible to use smaller airfoil thickness ratios as structural span is reduced, without incurring a weight penalty. It is obvious that the ratio of structural span to maximum wing-root thickness is the same for the straight wing and the swept wing, but the percent airfoil thickness in the direction of flight is thinner for the swept wing. For the delta wing this same ratio is obtained if the wing-root thickness is approximately five per cent. It should be pointed out, however, that other considerations such as torsional deflections and manufacturing difficulties also require a thickness ratio of about five per cent in order to make the design feasible. (Fig. 7.)

With the wing characteristics thus defined and the same fuselage for all the airplanes, and if the airplanes are to have approximately the same flying characteristics and to perform the same basic mission, the resulting gross weights are nearly constant.

(*Turn to page 92, please*)

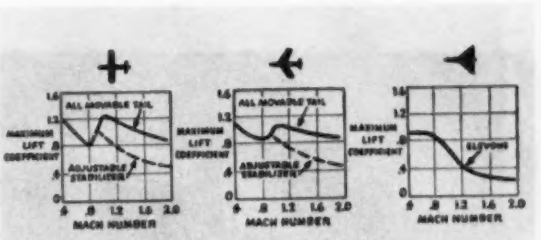


Fig. 15. Maximum lift coefficient vs. mach number

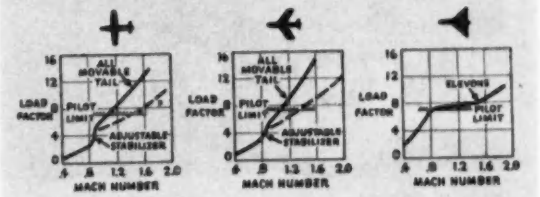


Fig. 16. Maneuvering characteristics

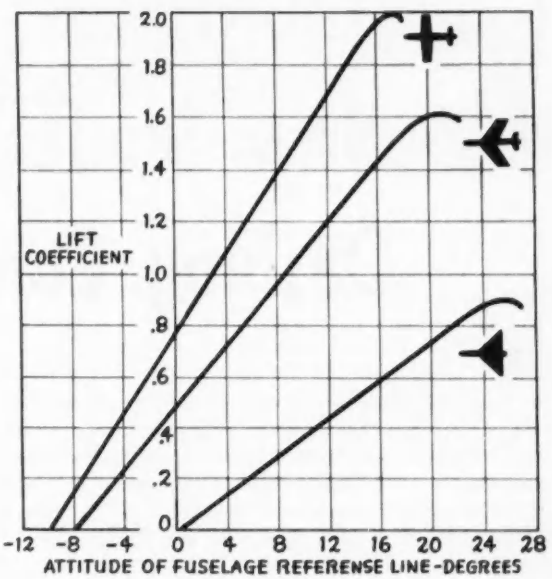


Fig. 17. Lift curves for landing configurations

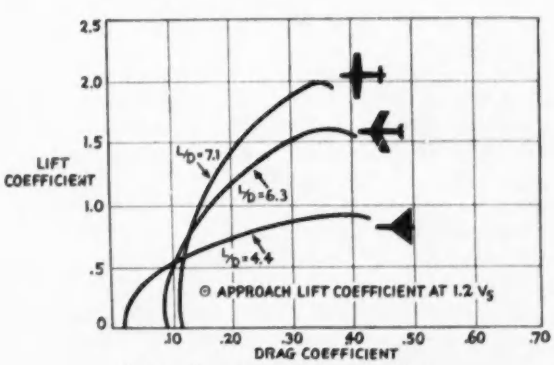


Fig. 18. Comparison of airplane polars

Side view of the Land Cruiser which is 202-9/16 in. long overall. Windshield and rear window moldings are of stainless steel, and side windows have chrome molding.

New Studebakers Feature Dashing Continental Lines

For 1953, Studebaker has unveiled a line of passenger cars that break as sharply with American contemporary design as did their predecessors immediately after World War II. Designed by Raymond Loewy, Studebaker's Centennial models reflect the influence of European styling and are completely different in both exterior and interior appearance.

Complementing the styling changes will be the availability of mechanical power steering for the Commander series, the first time this type of power steering has been adapted for passenger car use. Power steering for the Champion will be offered later in the year.

The hardtop convertible and five-passenger coupe are lower in overall height than any other standard American-built automobile. They are only 56 5/16 in. high. Their overall length is 4⅜ in. greater than that of the corresponding 1952 models, or 201 15/16 in. as compared with 197 9/16 in. Height of Champion and Commander sedan models is 60½ in. Overall length of Champion and Commander sedans is 198 9/16 in., and that of the Land Cruiser, 202 9/16 in.

Maximum overall width has been increased about one in., and the wheelbase of the hardtop and coupe is 120½ in. as against 115 in. for the same models in the '52 series. Wheelbase of the Champion and Commander two- and four-door sedans is 116½ in., and that of the Land Cruiser, 120½ in. Rear tread width on all models has been increased from 54 in. to 55½ in. Front tread width remains 56½ in.

Glass area has been greatly increased on all models, ranging from an increase of 133 sq in. on hardtop convertibles to 819 sq in. on the Land Cruiser. The total glass area of a four-door sedan, for example, is 33 per cent greater than on the corresponding 1952 model.

The front profile of the car is exceptionally low and the back sweep of the hood design is accentuated by a V-shaped "break." Two front grille openings are located directly above the bumper and extend outward on either side for the full width of the car. Each of these air scoops has a "floating" horizontal fin at the end of which are positioned parking and directional signal lights.

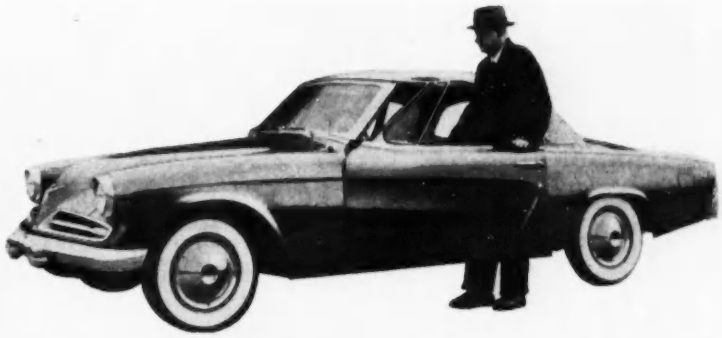
Front bumpers are V-shaped and nearly flush so as to blend into the overall design. A cooling air scoop extends along the front of the car just below the bumper.

Headlamps have visor-type bezels which help refract light beams. Front wheels on all models are fully

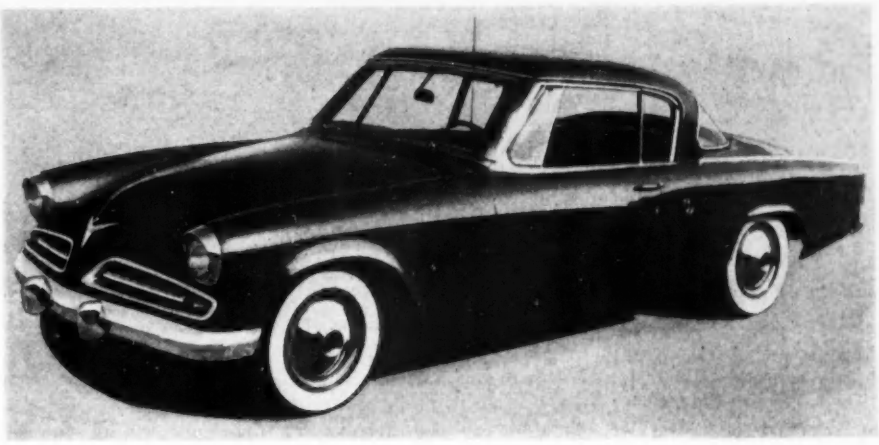
exposed; on hardtop convertibles and coupes fender openings are designed so as to expose more of the rear wheels.

On coupe and hardtop models the fin-type rear fenders are accentuated by long moldings extending from the leading edge of the rear window to the tips of the fenders. Tail lights, which blend into the rear fenders, are of vertical design with a back angle "rake."

Rear bumpers are V-shaped with kick-outs at either end to provide added protection for tail lights and the ends of the fenders. The rear license plate is recessed in a protective frame in the center of the bumper.



Overall height (below) of the Champion hardtop is only 56-5/16 in. Right shows H. S. Vance, chairman of the board and president of the Studebaker Corp., with the car.



Door handles are of the push-button release type. One-piece curved windshields are standard on all models, as are one-piece, wrap-around rear windows. Another change is the hinging of rear doors on the center pillars of four-door sedans.

Two-speed, electrical type windshield wipers are standard on Commanders, optional at extra cost on Champions.

Instrument panels are completely new. The design of the panel and cross section is characterized by a roll at the top, with a full-width chrome band just below in which are positioned control knobs. The instrument panel then bevels downward toward the front of the car. On the Champion, the instrument panel is enclosed in a single chrome housing, while on the Commander there are four separate dials, each with an individual visor. Toggle switches are common on all Champions and Commanders for 1953.

Dome lights on all sedan models are located on the left side rather than at the rear so as to direct their

The Champion series instrument panel has the instruments enclosed in a single chrome housing. Toggle switches are used on all Champions and Commanders for 1953.

The low, sweeping lines of European styling are apparent in this Commander four door sedan.

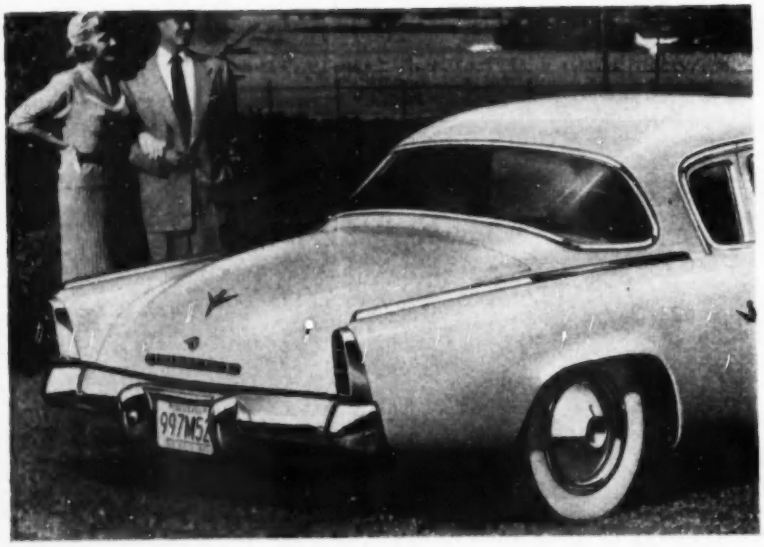
illumination over the left shoulder of the driver.

Steering wheels have depressed centers and the angle of the steering wheel in hardtops and coupes is slightly more vertical than in the past. In the same two body styles the front seat is divided slightly off center with the driver's section somewhat narrower than the adjoining section. This off-center design provides a larger areaway into the rear compartment for passengers entering from the right-hand side of the car and greater comfort for the middle passenger when three are riding in the front seat of the car.

From an engineering standpoint, power steering claims the spotlight with regard to the new models. Studebaker's mechanical power steering represents the first adaptation of this kind of power steering for general passenger car use. It will be currently available as extra-cost optional equipment on Commanders and Land Cruisers, and will be offered later in the year on the Champion series.

Developed by Borg-Warner Corp., Studebaker's power steering system differs from others now in use in that it is mechanical rather than hydraulic and obtains its power directly from the engine.

Chief elements in the new steering system consist of a power unit mounted on the steering gear, a power input shaft, and a pulley assembly. The power unit is a compact, six in. by six in. device weighing only 22 lb. Inside it are a gear train and two multiple disk clutches rotating in opposite directions.

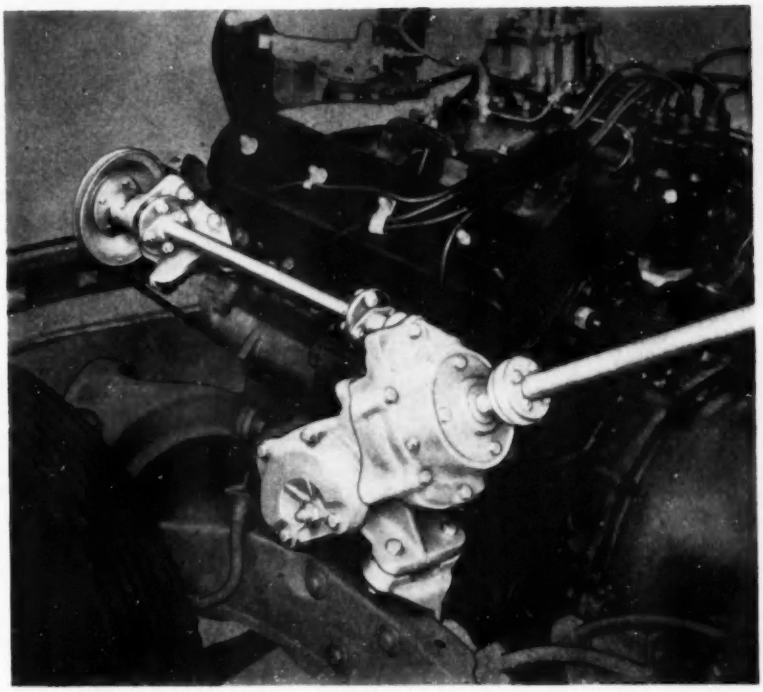


Rounded surfaces of the trunk lid accentuate the fin-type rear fenders of the Commander coupe. Bumpers are V-shaped, and the rear one is recessed to protect the license plate.

One of the clutches provides power for turns to the left, the other for turns to the right.

Power is delivered to the steering unit direct from the engine by means of a V-belt pulley on a small auxiliary shaft running parallel to the engine and back to the steering mechanism.

The ring gears inside the power unit revolve constantly while the engine is running, but do so at only one-fourth the speed of the engine. When the driver turns the steering wheel to the right, the lower ring gear and clutch come into play and transfer power from the engine to the steering gear, reducing by 75 per cent the effort that would normally be expended by the driver to make the turn. When a left turn is made, the upper ring gear and clutch come into action and accomplish a similar transfer of power. The additional power does not come into play, however, until the driver has expended at least two or more lb of turning effort. If for any reason the power steering should become inoperative, conventional manual control is engineered to be immediately available. A gear lubricant is used, and drivers whose cars are equipped with mechanical power steering will be asked to have this lubricant checked whenever the car undergoes a general chassis lubrication.



Mechanical power steering which is optional equipment on the Commander series. Principal elements are: a power unit on the steering gear; a power input shaft; and a pulley assembly.

Studebaker's six-cylinder engine powers the Champion series, while the Commander features the V-eight engine.

Chassis changes on both the Champion and Commander consist for the most part of refinements and modifications, a number of them because of the changes in style and design. Frames have been altered to conform to the new bodies, but structurally they remain unchanged. Radiators are wider and shorter, but cooling capacity remains the same. New engine mounts provide smoother vibration absorption. Carburetors have been re-designed to fit the lower hoods and at the same time provide greater efficiency. Dry-type air cleaners with replaceable cartridges are now standard on all models.

Other chassis refinements are improved rear springs, shock absorbers with a new type of valving which improves the cushioning action, and anti-roll sway bars.

A revised carburetor on the Champion incorporates an exhaust-heated flange to eliminate engine stalling due to ice formation in the carburetor during warmup on cold and damp days.

Clutch pedal linkage has been changed on both the Champion and Commander to obtain softer pedal pressure. The front suspension has rubber bushings in the inner ends of upper and lower support arms. These require no lubrication and furnish greater insulation against road noises and shocks.

• • •

Filling Government Forms is Costly Job

Business and industry long have complained about the cost and nuisance of filling out government forms and questionnaires, but up to now no one has come up with any kind of estimate of the expense borne by manufacturers for such activities. AMA has made a survey of the automotive industry and reports from 22 companies, including nearly all of the larger ones, show that it cost the industry more than $5 million a year and upward of 1-½ million man-hours to fill out Federal forms. The time required is equivalent to a year's work by 750 full-time employees. Actually, the figures are far below the actual cost for all government forms, since the survey did not include reports required by OPS and WSB, both of which are of voluminous proportions. The study showed that CMP forms, alone, require 784,000 man-hours annually and that 58,000 additional man-hours are expended on forms for other NPA activities.

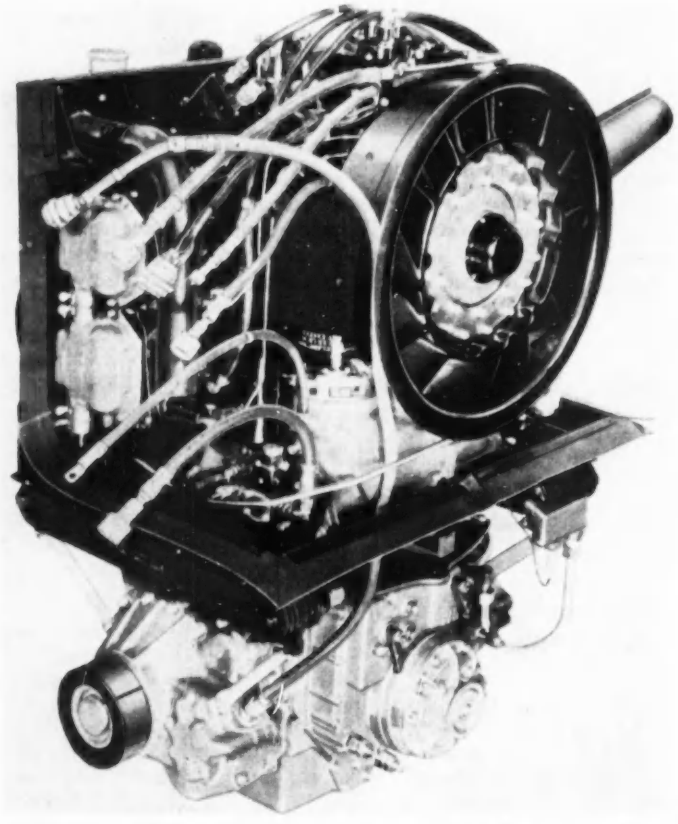
The time required in other categories are estimated as follows: Federal tax returns 305,000 man-hours; Department of Defense 49,000 man-hours; Air Material Command 15,000; Bureau of Census 8600; BLS 4000; Bureau of Mines 3100; Renegotiation Board 4500; and SEC 3800.

The Amphibious OTTER

ALTHOUGH news stories have appeared from time to time on the so-called Otter, the Amphibious Cargo Carrier T46E1, Army Ordnance now has officially revealed that the vehicle is being mass produced by Pontiac Motor Div., GMC, and has released additional details of design for publication.

Originally conceived as a versatile ground vehicle for carrying cargo and personnel in Arctic operations, its scope has been greatly extended in the interim. It is a truck-sized vehicle, completely enclosed and water- and weather-sealed for deep fording. Its overall length is 190 in. and its width is 98 in. Despite its size, all-aluminum construction holds gross weight to 12,000 lb, including 3000 lb of payload.

Top speed on the ground is around 28 mph. It is fitted with a hinged propeller and is capable of a speed of approximately 4½ mph in water.



Otter powerplant as it is mounted in vertical position in the vehicle. The blower at the right faces to the rear of the vehicle. The cross drive transmission is mounted directly below the engine, and transmits power to the forward end of each track.

The powerplant, as illustrated, consists of the Ordnance type aircooled Continental engine, an opposed four-cylinder unit, developing 130 bhp, and mounted vertically in the interest of space economy. At the lower end, the engine is attached directly to a special cross drive transmission of torque converter type, and fully automatic in operation. Known as the CD-150, the transmission is built completely by Pontiac.

The engine employs magneto ignition and is fitted with an American Bosch fuel injection system for handling military fuel. An important feature of the fuel system is provision of constant fuel circulation to and from the fuel pump by means of Carter electric fuel pumps in the two fuel tanks. This is said to assure a constant flow of solid fuel without danger of vapor lock under any conditions. The engine also is equipped with a Novi hydraulic governor to limit maximum speed to 3200 rpm.

Because of the tight sealing of the entire structure, as well as the confined quarters in which the engine is mounted in the front compartment, special attention has been given to fresh air ventilation and exhaust. A large fan is installed in the front compartment bulkhead, driven by the engine, to provide engine cooling and at the same time to handle the requirements for ventilation and exhaust. Cooling air is drawn down two vertical ducts located in the air stack, connecting with a large

Side view of Otter currently in production at Pontiac Motor Div., GMC. Mostly of aluminum construction, this vehicle has enormous flotation on the ground, track pressure being held to an amazing minimum of two psi.

horizontal tube and passing to the engine compartment through the cooling fan. A portion of the air is directed down through the external engine and transmission oil coolers while the rest passes around the finned cylinders. Below the coolers the air passes rearward and up and out through the center duct in the air stack. It will be noted that this arrangement takes care of air and exhaust requirements when fording.

The cross drive transmission provides power directly to a sprocket at the forward end of each track through a universal joint drive. Power transmission, braking, and steering are combined in this arrangement.

The track on each side is of exceptionally lightweight construction, consisting of reinforced rubber belts connected on the underside by closely spaced steel track bars which contact the wheels. Four dual-tired wheels are mounted on each side on suspension arms fixed to torsion bars. The front and rear arms extend past arm hubs to form supports for the drive sprockets at the front and idler wheels at the rear. This arrangement provides proper track tension under all operating conditions, over irregular terrain.

The tracks are 30 in. wide, and track contact with the ground is 97 in. in length. This is said to result in the lowest unit pressure on the ground to be found in any cargo carrying vehicle—approximately two psi.

The propeller, housed at the rear in a protected location, is driven by a power take-off from the transmission through a hydraulically-operated mechanical clutch. The extended propeller drive also is arranged to drive two main bilge pumps while fording. It is of interest that the propeller is of hinged type, swinging out of action when not in use. It is also provided with freedom of horizontal angular movement to provide steering when fording.

As mentioned earlier, the vehicle is substantially all-aluminum, except for functional parts such as crankshaft, camshaft, cylinder barrels, connecting rods, gears, and torsion bars which must be made of steel. The massive girder underbody structure, body, ducts, and other structural parts all are of aluminum. The aluminum skin on the hull is of stressed design so as to contribute to structural strength and rigidity with minimum weight.

As in the case of all Ordnance vehicles, the Otter is capable of starting and operating at temperatures down to minus 65 F. For such Arctic conditions, however, the vehicle is provided with special winterizing kits for the engine as well as for heating the interior. Stewart-Warner South Wind heating equipment is used in the winterizing kits.

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Canadian Vehicle Fleet Climbs to 3 Million

By comparison with the congested highways in the United States, Canadian roads apparently are a paradise for motorists. Total motor vehicles on the road in Canada last year reached three million for the first time compared with an estimated 53 million in the United States. It required four years for the Canadian automotive fleet to go from two million to three million vehicles compared with 15 years to add the preceding million. Total Canadian production of automotive vehicles last year was about 435,000 units—285,000 cars and 150,000 commercial vehicles.

Specially Tooled Press

Saves Time in Assembling Filters

Standard, oil-hydraulic Denison Multipress of six-ton capacity, specially tooled and equipped with 12-station dial feed table.

FILTER subassemblies are being produced by a large maker of specialized aircraft, automotive, and industrial parts six times as fast with a specially tooled, oil-hydraulic press as with equipment formerly used. The press now in use is a standard six-ton capacity Multipress, with 12-station dial feed table, made by the Denison Engineering Co. Each dial station is fitted with a bottom die. An upper die shoe with two-stage closing die is mounted on the press ram.

The filter subassembly produced on this press consists of three parts: two ring-shaped disks of wire mesh, and a brass grommet. Both outside and center-hole diameters of the parts must be held to precise dimensions. The operator pregathers first the grommet, next the first of the two screens over it, and the second screen over that.

These subassemblies are fed onto the dial through a slide or trough at the left of the table. The end of this trough extending over the dial has an opening that allows each bottom die to lift off the parts as the dial rotates. Dies are cam operated and each has a raised center that enters the grommet. Held by this projection, the subassembly is carried under the ram-mounted closing die. At the first pressing station, the grommet is partially crimped. It is automatically indexed to the second station for final crimping.

By delivering smooth, preset pressure with each downstroke, the Multipress ram permits holding a tolerance of 0.002 in. in the finished subassembly.

Ejecting and stacking of the completed parts are ingeniously combined in this setup. Air ejects the parts from the die and a 180 deg curved bar over the die directs them onto an upright stacking guide at the right side of the press. The air ejection device is focused on the third position of the dial feed beyond the final pressing station. Piping connects this to an air valve on the throat of the press. Each time the ram descends the top die shoe strikes the valve lever and releases a spurt of air that blows the part from the die.

Extra dials, interchangeable on the table, facilitate application of the Multipress at this plant to other jobs. There are four of these dials, each tooled differently for specific operations. The press also has controls to permit adjustment of ram stroke length, pressing speed, and pressure up to the six-ton maximum.

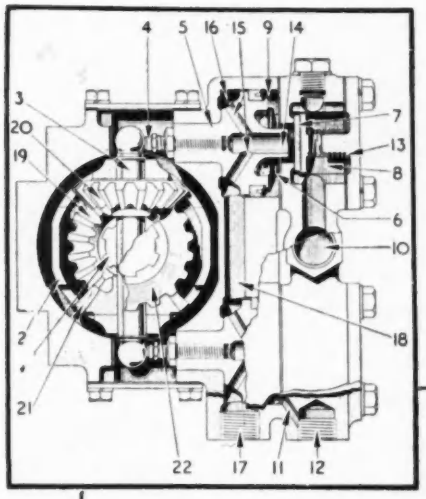


FIG. 2
Transverse section of valve mechanism and cutaway view of differential.

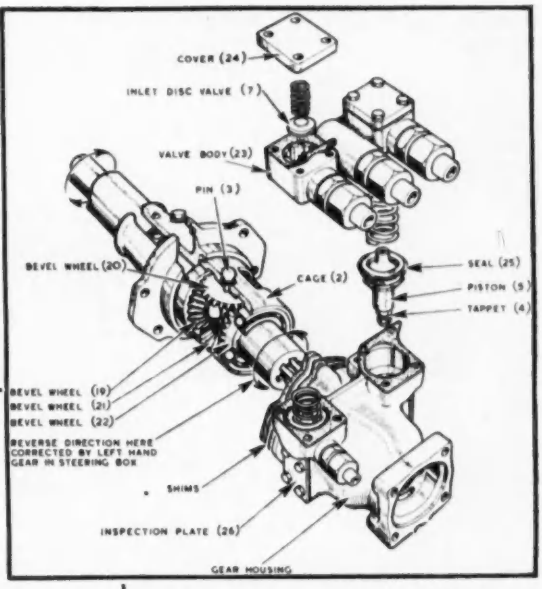
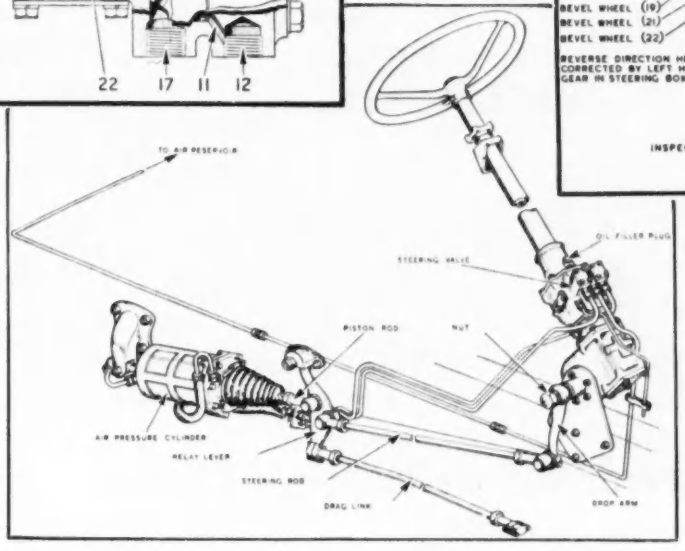


FIG. 1
Exploded view of power steering valve and differential.



General layout of power steering gear.

By W. F. Bradley
Special European Correspondent for AUTOMOTIVE INDUSTRIES

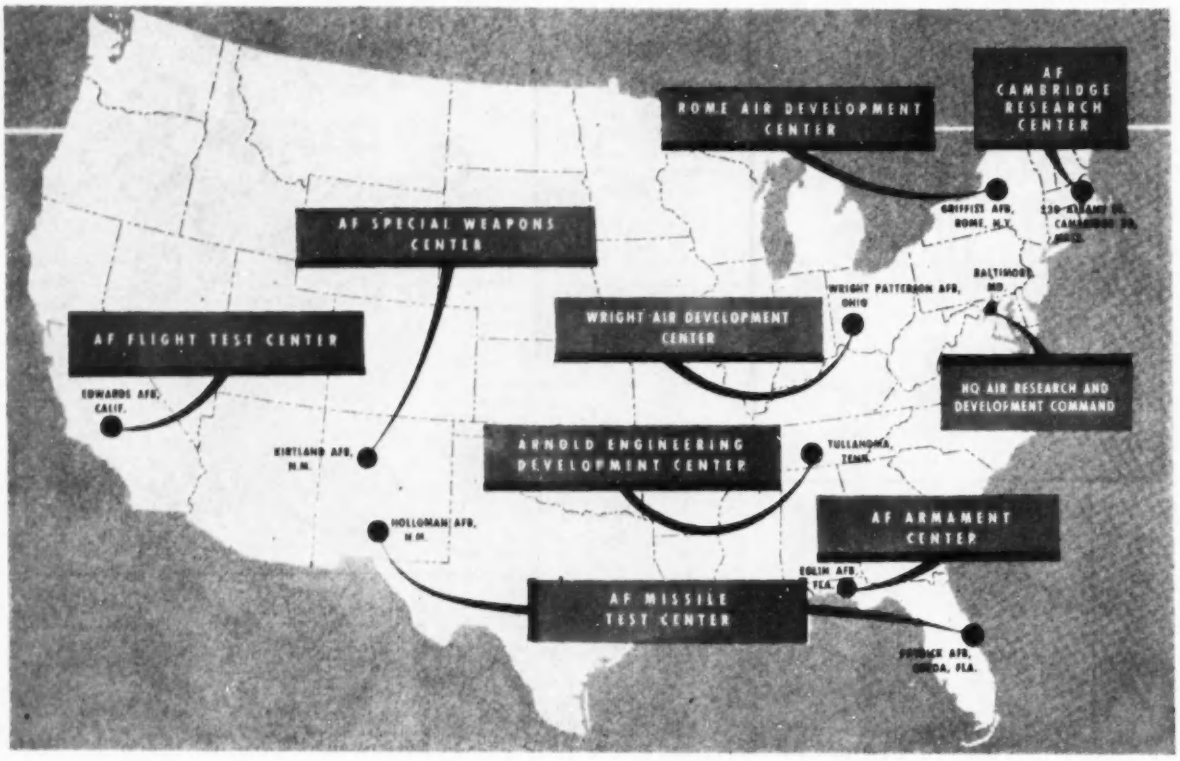
Air Power Steering

AIR POWER steering is employed on the heavier vehicles produced by Scammell Lorries, Limited, of England, maker of large capacity three- and four-axle vehicles. This differential type power steering is a combination of Marles cam and double roller steering box and the Clayton-Dewandre air pressure power steering valve, working in conjunction with a double-acting air pressure cylinder.

The differential type power steering valve assembly forms an extension to the steering case, replacing the usual column, and fulfilling all the functions of the latter, in addition to controlling the power assistance to the vehicle steering.

The steering valve is supplied from the air pressure reservoir of the vehicle, and the two outlet ports are connected to the double-acting air pressure cylinder linked to the steering drop arm and to the vehicle's front wheels. Movement of the stering wheel actuates the differential gear assembly of the valves, and the operating rod (integral with this assembly) then operates one of the two inlet valves according to the direction of rotation of the steering wheel. This allows compressed air to pass to the appropriate side of the piston in the power cylinder, thus exerting an effort on the steering gear in the required direction. In case of air pressure failure drive becomes conventional.

Referring to the exploded view, Fig. 1, and the transverse sectional view, Fig. 2, it will be seen that the steering wheel and bevel gear (19) rotate as a unit as they are attached to opposite ends of the same shaft. With the bevel gear (22) held temporarily stationary by resistance of the vehicle's road wheels, rotation of bevel gear (19) moves cage (2) through action of bevel gear (20). This motion brings one of the ball ends of pin (3) against a tappet (4) on one of the pistons (5). Opposite rotation of the steering wheel would, of course, actuate the opposite piston. The release valve, which is an integral part of the valve piston, closes when contact is made with the inlet valve (7). *(Turn to page 114, please)*



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News of the MACHINERY INDUSTRIES

By Thomas Mac New

Throatless Presses of Massive Monolithic Concrete Construction Will Provide 360 Deg Access to Working Area.

Throatless Presses Projected

The Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, and the Austin Co., Cleveland, Ohio, have joined forces to form a new company — Throatless Press Co. — for the development of presses in the 75,000 ton capacity and higher bracket. Of throatless design, these new presses will provide 360 deg access for placing and removing dies and work of any size required in closed die forging, rubber pad forming and die quenching operations.

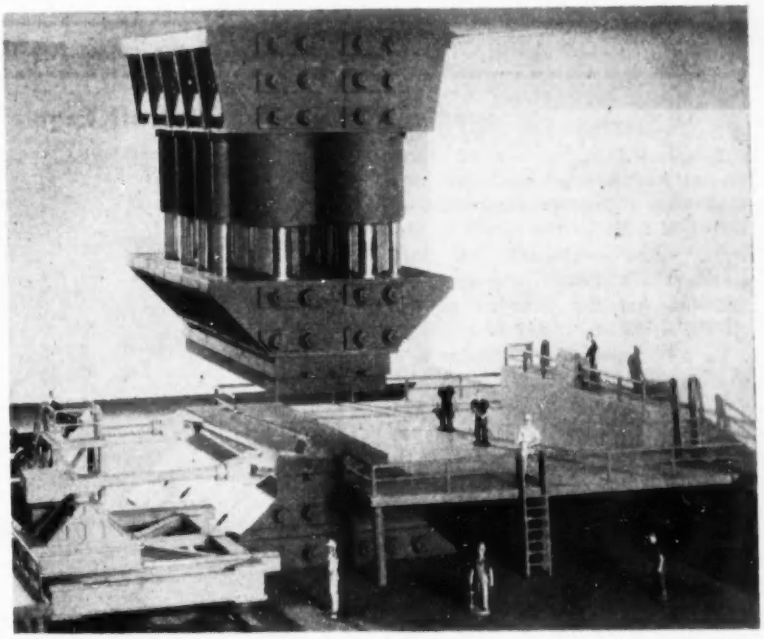
One of the major advantages, construction-wise, according to the co-owners of the new firm, is that the presses can be built with existing machine tools and construction equipment, and shipped with existing transportation facilities.

Utilizing a massive monolithic concrete structure which would serve the three-fold purpose of supporting, suspending, and completely housing all of the required press elements and operations, the press mass would provide the counter-force necessary to form huge members for military and commercial aircraft.

Since the complete study has not been finalized, only approximations have been made concerning basic dimensions. It has been indicated that the structure would have an overall height of 180 ft, 30 ft of which would be below the ground level "press room." The two frame walls would be set 80 ft apart and there would be a clear height of at least 50 ft below the concrete mass which they support and which would form the enclosure for the operating portions of the press. An initial length of 120 ft has been approximated.

All of the press components would be supported on the structure so as to utilize their weight as part of the overall counter-force and to hold runs of pressure piping to minimum lengths in the interests of operating efficiency and economy. Twelve high-pressure vessels weighing 90 tons each would be mounted high on exterior walls and would serve as the accumulators in which the pressures would be built up to operate the press. A 100-ton capacity travelling crane, gantry type, would be erected on the roof for use in raising the pressure vessels and in handling huge pumps and compressors to be installed on the roof for operation of the press. These units would have an aggregate capacity of approximately 10,000 hp.

The throatless press concept originated with C. A. Van Dusen, managing partner, Van Dusen Engineering Co., Escodido, Calif., and the rights were assigned to HPM and Austin for development and construction.



A three-dimensional scale model of the throatless press was utilized to illustrate how this new concept of press design provides 360-deg access for placing and removing dies and work of any size. The manipulator, shown at the left, holds a workpiece.

ASTE to Stress Productivity

Increased productivity and its ally, cost reduction, will be two factors which will be emphasized at the technical sessions of the 21st Annual Meeting of the American Society of Tool Engineers to be held in Detroit, Mich., March 17 to 20.

Tool Cancellations Cut Industry's Backlog

Continued falling off in new business and some further cancellations have reduced the machine tool industry's backlog to less than 11 months' capacity, compared with the 18-month backlog a year ago, and a high point of 23.5 months in September, 1951. The backlogs, however, are not evenly distributed among all machine tool builders, so that some companies have

(Turn to page 126, please)

Howard M. Palmer, general sales manager, Lewis-Shepard Products, Inc., Watertown, Mass., has been elected President of the Material Handling Institute.

NEW EQUIPMENT — PLANT • PRODUCTION

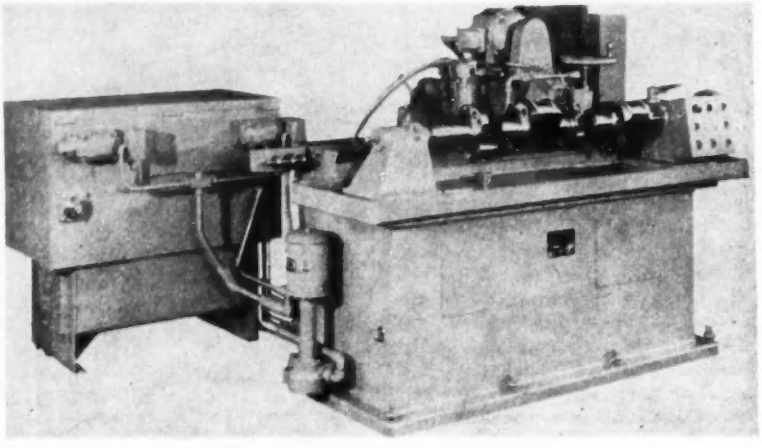
FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81

Special Machine for Aircraft Engine Crankshafts

Model MR136 is one of three special machines designed and built to perform drilling, reaming and spotfacing of holes in the cheeks of aircraft engine crankshafts. All three machines are similar in general appearance but the function of the MR136 is the spotfacing of holes.

Each of these three machines is a single-spindle type with the spindle mounted in a specially designed head unit to suit the restricted space requirements encountered in the work piece. The crankshaft to be drilled, reamed or spotfaced is mounted in the fixture which allows it to be rotated on its axial center line.

The head unit carrying the spotfacing spindle on the MR136 machine, and the drilling and reaming tools on the other two machines, can be manually indexed parallel to the axial center line of the crankshaft. A manually operated locater used in conjunction with this indexing provides means for accurate setting of the spindle unit for different crank throws.



Moline spotfacing machine, Model MR136.

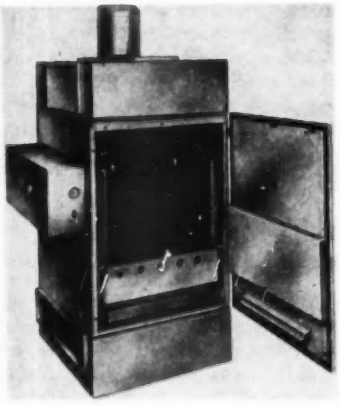
Electrically controlled hydraulic power is used for moving the spindle and cutting tool at right angles to the length of the crankshaft to bring the tool into working position or to withdraw it preparatory to indexing to the next crank throw. The feed travel of the spindle unit also is by electrically controlled hydraulic power. Feed cycle for spotfacing on the MR136 is automatic and is initiated by push button control. The same is the case for the drilling and reaming feed cycle on the two companion machines. *Moline Tool Co.*

Circle E-1 on page 81 for more data

Oil Mist Control Unit Completely Redesigned

A completely redesigned Precipitron oil mist control unit that will recover the coolant oil from the mist and smoke generated by high speed cutting, grinding, milling, and similar machining operations is now available. This redesigned oil mist control unit is available in two models: Type PO-6 and PO-12. PO-6 has an air handling capacity of 600 cfm; PO-12 of 1200 cfm.

Salvage or recovery of coolant oil is only one of the benefits made possible by this oil mist control unit. Others are: (1) A reduction in such industrial hazards as slippery floors, fire hazards, reduced illumination, and contaminated atmosphere; (2) a savings in heating costs up to $300 a year per unit by not exhausting usable heated or conditioned air; (3) an improvement in employee attitude that comes from working in clean surroundings; and (4) a reduction in building maintenance costs such as structural members, windows, lighting fixtures, heating ducts, steam and water pipes; machine tools and floors will not be coated over with a greasy film in an oil and smoke free atmosphere.



Westinghouse oil mist control unit, the Precipitron.

The Precipitron is completely contained: the sheet steel cabinet houses the all aluminum oil-particle charging and collecting elements with their high voltage power pack; the motor driven fan; duct connection; and oil sump. *Westinghouse Electric Co.*

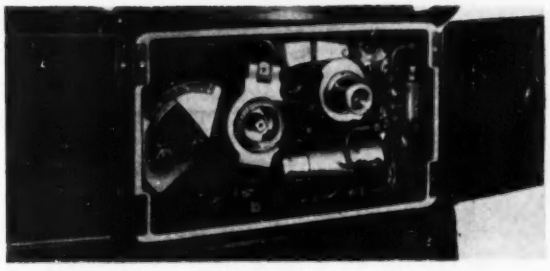
Circle E-2 on page 81 for more data

Mechanism Provides Conventional or Diagonal Gear Shaving

Red Ring engineers have developed a mechanism which when built into a diagonal gear shaving machine provides automatic precision up-feed in selected increments throughout the shaving cycle and automatic return to the proper backlash position for loading and unloading at the end of the cycle. This offers the user the choice of either conventional or diagonal shaving in the same machine.

When shaving diagonally the cycle is no longer limited to two strokes. It may now include several cutting strokes each with its own increment of up feed and, in addition, one or more idling strokes. Cycle time, however, notwithstanding the greater number of strokes, has been decreased due to the very rapid up-feed and increased cycling speed. Increments of up-feed may be constant or varied, but each is precisely controlled.

The net result is claimed to be higher gear production, greater accuracy in the product and an increase in cutter life of up to 200 per cent.



Red Ring gear shaving mechanism.

The amount and accuracy of up-feed is governed by a double-sided master cam and actuated mechanically. In a typical case the knee rises approximately 0.022 in. from the backlash position for loading or unloading to bring the work gear into shaving mesh. If the feed for the initial cutting stroke is 0.002 in., the total rise is 0.024 in. This is accomplished by differential feeding in one sec.

The cam is manufactured to accommodate a combination of various feeding cycles. If it is decided to reduce the number of cutting strokes, only part of the cam surface is used in service. Flexibility of the feed mechanism is such that any desired cycle may be used.

The up-feed control mechanism is housed in a closed cabinet at the front of the knee. An observation window permits the operator, at any time, to read a circular scale which indicates the amount of up-feed for each cutting stroke. *National Broach & Machine Co.*

Circle E-3 on page 81 for more data

Honing Machine for Precision Finishing

Features of the Model 844 Microflat Microhoning machine, for precision finishing of optically flat surfaces up to 20 in. diam, include four different speeds in the head, simultaneous changing of spindle and wheel speeds, motorized wheel dresser mounted on machine, control of head oscillation, and pneumatic lift up of spindle.

Micromatic honing machine, Model 844.

Spindle speed may be changed, independent of wheel speed, by insertion in the head of any one of four worm gears, ranging from single to quadruple thread.

Direction of spindle rotation is controlled by a clutch that has three positions: forward, neutral, and reverse.

The abrasive wheel is geared to the same motor that drives the spindle. To permit the permanently-mounted motorized dresser to swing over the wheel in the dressing position, the head may be moved without disturbing its previously set oscillating stroke.

An air cylinder provides for lift up of spindle and attached fixture. An adjustable stop on the quill housing permits repetition of height setting and adjustment for wheel wear. *Micromatic Hone Corp.*

Circle E-4 on page 81 for more data

(*Turn to page 76, please*)

NEW EQUIPMENT PLANT · PRODUCTION

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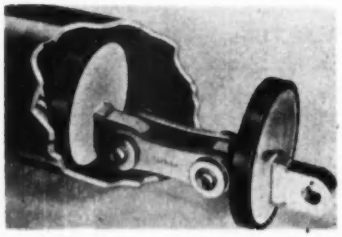
(*Continued from page 75*)

Chip Conveyors

Automatic removal of chips from machine tools is provided by the installation of tubular sealed-pin chain conveyors as original components. These conveyors can be arranged singly or in multiple banks, and are installed to discharge chips into tote box, bin, or "main line" conveyor to a central collecting station.

Not only as original equipment, but on existing machines, these conveyors operate on milling machines, broaching machines, grinders and multiple station units. They are also used on other metal-working equipment, such as collecting sludge from quench tanks, automatic welding equipment and other uses. *Hapman Conveyors, Inc.*



Hapman chip conveyor section.

Circle E-5 on page 81 for more data

Press Type Brake

Functions of a press brake and a stamping press are combined into a machine that is now on the market. The press type brake has a standard speed of 45 strokes per minute or as high as 60 on fast light work. Closed side housings, oversize slide areas, end feeding, a new direct-acting clutch-brake combination are some of the features.

This press type brake has a stroke of five in. and a shut height of 14 in. with a ram adjustment of five in.

Serial operation and end feeding is said to speed up production. Fully rated at 150 tons each in five sizes; four ft, six ft, eight ft, 10 ft and 12 ft bed lengths, the press type brake is a multi-purpose machine. *Cyril Bath.*

Circle E-6 on page 81 for more data

Bath press type brake.

Liquid Rust Inhibitor

Anarust, a liquid rust inhibitor for wet blasting machines, has been developed and is now on the market.

Anarust is a material of organic composition, and it is completely soluble in hard or soft water at 20 C. Water staining is said to be kept to a minimum on ferrous parts which are rinsed in it. Its specific gravity is about 1.0 at 20 C.

When used at the rate of approximately ½ oz per gal of water, it is an effective agent in retarding rusting on cast iron or steel parts which are being cleaned and washed after wet blasting. It can also be safely used on parts prior to undergoing such operations as plating, enameling, painting, etc. *American Wheelabrator & Equipment Co.*

Circle E-7 on page 81 for more data

Reactor Control Provides Constant Cutting Speed

To maintain constant cutting speed for the machining of large disks a control employing a small reactor has been developed. To control the machining of a given piece, a simple, small cam is cut. A probe from the reactor, which is contained in a box about four inches cube, rides on this cam as the cutting progresses. As the probe moves up or down—a total distance of only 9/16 in.—it moves an armature that changes the reluctance of the reactor magnetic circuit. Through an electronic exciter this varies the motor field strength to change the d-c motor speed to hold the cutting speed constant.

Westinghouse reactor control.

The motor has an eight-to-one speed range, obtained solely by control of motor field strength. This speed range is double the amount ordinarily available by field control and is made possible by two sets of windings on each of the four poles. These are automatically connected in different sequences to obtain net flux changes much larger than normal. *Westinghouse Electric Corp.*

Circle E-8 on page 81 for more data

Rotary Internal Gear Finisher Features Versatility

Model 870-C internal gear finisher for spur and helical internal gears up to 12-in. OD has been brought out. Internal gears as small as four-in. pitch diameter can be finished on the machine, and smaller sizes can be accommodated with a special cutter spindle.

The machine operates with the transverse (reciprocating) shaving method. The cutter is reciprocated across the face width of the internal gear in a crossed axis arrangement while being driven by the work. Reduction of the center distance between the work and cutter by an automatic up-feed mechanism which also provides for one or two finishing passes brings the gear to correct size.

Plunge shaving can also be accomplished on the Model 870-C by adding an optional plunge-feed mechanism. This method uses a serrated-tooth shaving cutter wider than the work. The workpiece is rotated, driving the cutter, and no reciprocation occurs while the workpiece feeds upward automatically. In both shaving methods upfeed is completely automatic, feeding the work up to size and returning it to loading position. Machines having the plunge feed mechanism can also operate with the transverse method without alteration.

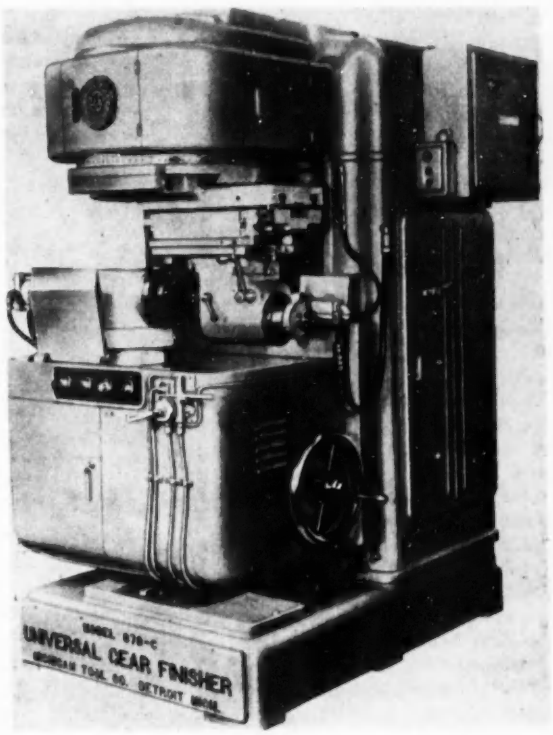
Design features of the machine include:

1. Heavy-duty dove-tailed slide suspension for the cutter spindle.
2. Cone-drive gearing in the cutter spindle reciprocating drive mechanism.
3. Vernier scales and a dial indicator.
4. Accessible change gears and controls.
5. Sealed electrical panels.
6. Ribbed main column plus engineered weight distribution.
7. Adjustable power driven knee.
8. One-shot lubricating system for ways, knee and rotating parts.
9. Pressure lubricating fittings on cutter and work spindle.
10. A baffled 60-gallon settling tank in the base of the machine plus an optional magnetic chip separator.
11. Safety features: Opening electrical panel door cuts power to machine; double start pushbuttons; sliding shields that control flying chips.

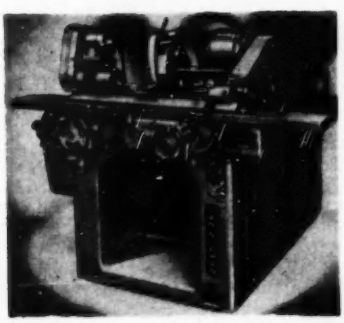
The internal gear shaver with standard cutter spindle uses cutters having pitch diameters from three to six in. Maximum stroke of the head is five in. Maximum gear face width is 4¾ in. and coarsest recommended work pitch is five diametral pitch.

It is powered by four electric motors: A fan-cooled three-hp main drive motor, a ½-hp collant pump motor, a ½-hp head movement motor and a ⅓-hp infeed motor. Machine dimensions are: Width, 45⅝ in.; depth, 62¼ in., and height, 84⅛ in. It weighs 11,000 lb. *Michigan Tool Co.*

Circle E-9 on page 81 for more data



Michigan internal gear finisher.



Van Norman cylindrical grinder, Model 418.

Cylindrical Grinder for Small Parts

Now available is the 418 grinder especially developed for fast precision traverse or plunge cylindrical grinding of small parts on a production basis.

Included among the many features of the 418 grinder are: Pope wheel spindle, wheel slide rapid retraction and slide base well proportioned and constructed for rigidity and maximum accuracy. Automatic starting and stopping of headstock and table traverse. Semi-automatic lubrication. Grinding wheel speeds of 1772 and 2067 rpm. Headstock work speeds 153 to 940 rpm. Maximum grinding diameter four in. Maximum distance between work centers 18 in. Floor space required 43½ by 79¼ in. *Van Norman Co.*

Circle E-10 on page 81 for more data

(*Turn to page 78, please*)

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(Continued from page 77)

Air Gaging Device for Many Applications

An air cartridge unit, a gaging device used in conjunction with Air-O-Limit gages has been developed for a wide range of applications.

The air cartridge unit can be used in both single and multiple station fixture-type gages much the same as dial indicators can be used. Practical applications include checking such factors as squareness, height, contour, concentricity, flatness, and depth.

Internal and external average diameters can be checked by using multiple cartridge units in a gaging plug or ring.

The unit can be applied to machine tools to indicate runout. As a direct size indicator it will give the operator an indication as the finished dimension is approached.

Height gage applications in connection with surface plates, can be made by mounting the air cartridge unit on a height gage stand and using it in conjunction with a standard P & W Model "F" comparator.

The unit consists of a plunger with a contact point on one end and a stainless steel ball on the other end operating with axial movement in the cartridge body. Air flow through the cartridge unit is restricted by the ball on the plunger operating in a tapered hole in the body, thus setting up back pressure required to operate the Air-O-Limit Gage. A contact of three oz is needed to operate the unit.

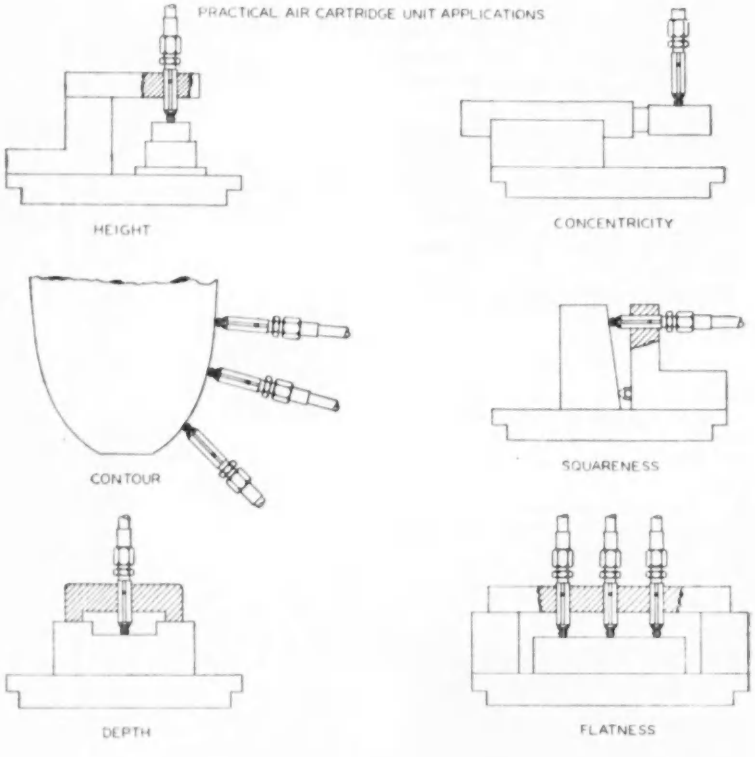
The broad scale air cartridge unit, when used with an Air-O-Limit gaging fixture, is calibrated by means of a set of minimum and maximum feeler gages.

Small and compact, the air cartridge unit measures 1¾ in. long and ⅜ in. diam. The back of the unit is threaded to fit standard Natvar tubing for connection to the comparator.

Standard air cartridge units are made primarily for coarse tolerance work and are available in three magnification ranges operating on total scales of 0.010 in., 0.015 in., and 0.020 in. However, units can also be furnished for total scales ranging from 0.0006 in. up to 0.003 in. *Pratt & Whitney, Div. Niles-Bement-Pond Co.*

Circle E-11 on page 81 for more data

Pratt & Whitney air cartridge unit is shown here with a Model "F" Air-O-Limit comparator and master maximum and minimum feeler gages.



Speed Reduction Drives

Shaft-King, a series of 20 to 1 ratio speed-reduction units featuring improvements in gears, bearings, housing, lubrication and oil sealing systems, has been placed on the market.

Gearing in Shaft-King speed reducers consists of two trains of the single helical type. An exclusive construction feature is said to be the use of both ball bearings and tapered-roller bearings.

Gearing and bearings are continuously splash-lubricated by the high-speed gear and the counter-shaft pinion which run in a large oil reservoir in the lower third of the housing.

Interchangeable split tapered bushings with locking nuts are claimed to make the units adaptable to any shaft size up through 3-15/16 in. *American Pulley Co.*

Circle E-12 on page 81 for more data

More Functional Use for Gage Blocks in Design and Production

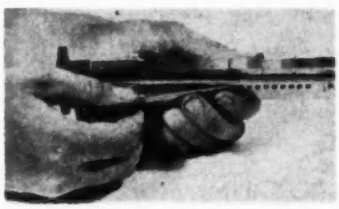
A recent development in gaging makes it possible to assemble gage blocks into gaging instruments for practically any gaging or layout application. In so doing, the system is said to provide three benefits. First, it permits the direct application of gage block accuracy to everyday gaging and layout operations. Secondly, it elicits more productivity. Thirdly, it reduces costs since it permits the construction of practically any type gage for any common or special application.

The development is designated the "Micro-Step" System by its originator. Essentially, it is a series of unique gage block holders and end standards. The holders, available in a range of sizes, permit setups up to 72 in. long in increments of as little as 0.000025 in. but with additional holders and gage blocks any length is possible.

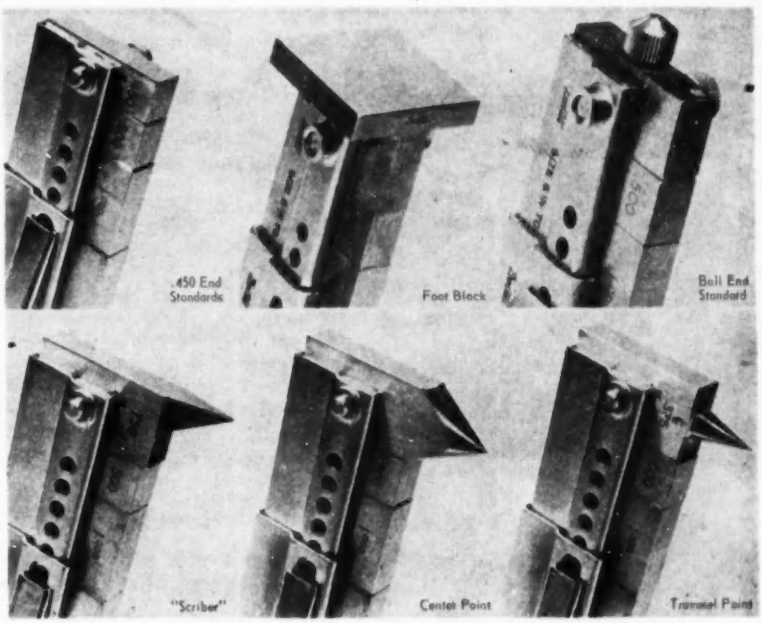
The "end standards" may be considered functional gage blocks. They incorporate the working surfaces needed for constructing measuring instruments—their dimensions are within gage block tolerance.

The holders in the system are comprised of channel-type members in graduated sizes which provide a measuring range of from two in. to 72 in. and beyond; one caliper holder, one in. to six in. range, for outside and inside calipers, dividers or scribing compass and numerous other balanced assemblies. A channel-type holder consists of a "channel extension" and a "base holder." To form a complete holder, an extension is slipped into the base holder. Extensions and base holders are available in different sizes to cover different measuring ranges. *Do-All Co.*

Circle E-13 on page 81 for more data



The L-ended rods on the base holder are pressed against the sides of the holder and the thumb screws are tightened to draw the extension into the base holder. This clamps the entire assemblage together.

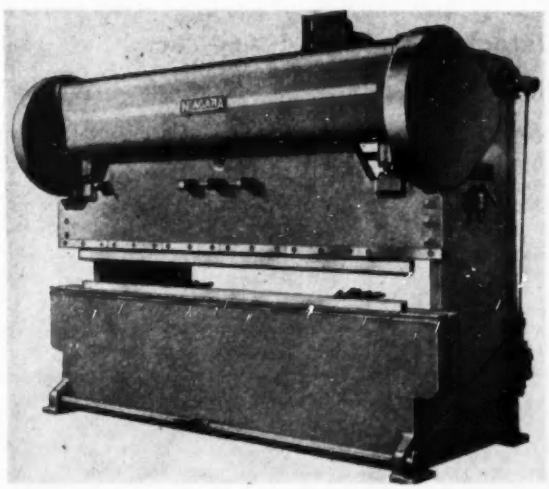


Some of the end standards in the Micro-Step System.

Press Brake Available in Three Series

A line of all steel press brakes which includes a 50 ton series, a 100 ton series and a 150 ton series has been announced. Bending, curling, jogging, corrugating, notching and punching are a few of the many operations these machines can perform.

Among their many features are laminated non-metallic ways, double reduction gearing and double end twin drive with gearing enclosed in sealed baths of oil.



Niagara press brake.

The aircooled clutch and brake can be controlled either by foot treadle or by palm buttons fastened to the ram which permit jogging, single stroking and continuous operation. With a motor reversing switch, the flywheel can be reversed to pull the ram out of accidental stalls.

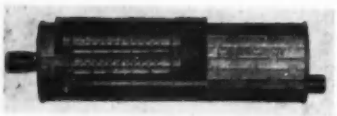
A deep crown and twin plate bed permanently welded to the side frames form a one piece frame.

Self locking, power operated ram adjusting screws are fitted with micrometer dials to permit duplication of settings for repeat jobs. By uncoupling the shaft between the screws the ram may be tilted by power for tapered work. *Niagara Machine & Tool Works.*

Circle E-14 on page 81 for more data

NEW PRODUCTS

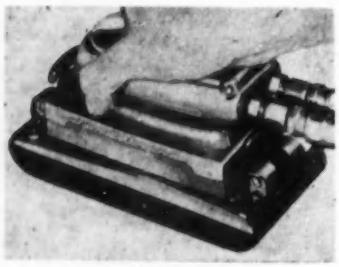
FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81



Ribbed Double-Shell Muffler

Now available is a double-shell muffler with both shells ribbed. Besides preventing vibration, the muffler also will eliminate shell noise. *Maremont Automotive Products, Inc.*

Circle P-5 on page 81 for more data



Orbital Sander for Rough Jobs

Recently developed is an orbital-type air sander with built-in water attachment for wet sanding. The unit is said to enable the removal of material more rapidly and at less cost.

The speed of operation (up to 6500 cpm) is claimed to make the sander suitable for rough sanding and preliminary operations by providing good "make-ready" for finer finishing where needed. Air consumption is 4½ to seven cu ft per minute.

The small 4½-lb unit has counterbalanced operating parts. Ease of operation is reportedly assured by the palm lever control on top. *Pneumatic Div., Sunstrand Machine Tool Co.*

Circle P-6 on page 81 for more data

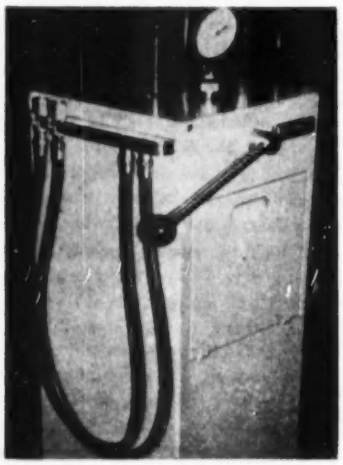
Heat Exchanger for LPG Carburetors

Recently announced is an improved heat exchanger in a line of carburetors for LPG. Perfect vaporization and smoother power are claimed for the exchanger.

The unit is precision-made of a high efficiency aluminum alloy. The coils are cast-in to eliminate gasket and connection problems. The back gasket is thinner and serves as a safety diaphragm.

If for any reason the converter should freeze, this diaphragm reportedly takes up the expansion without damage to the coils or casing. In addition to its light weight and compact size, the unit is said to resist corrosion from weather, hard water, or chemicals. It requires no adjustment after installation, according to the manufacturer. The device is applicable to production and conversion LPG engines. *Century Gas Equipment Co.*

Circle P-7 on page 81 for more data



Leak Detector for Castings and Parts

Recently developed is a hydrostatic leak check stand designed to test for leaks in small castings and interdrilled passages in a variety of parts. Hand pumped pressures up to 1000 psi are available; volume per stroke is approximately one cu in.

A poppet-type four-way valve is used to make possible evacuating a cavity as well as filling it. In addition, a needle valve is used to insure holding pressures over long periods of time.

Quick connective couplings are standard; adapters, usually "O" ring sealed, are designed to suit specific applications. A compartment is provided as part of the unit to store adapters conveniently.

Pressure is obtained from an aircraft-type hand pump which is supplied from a five-gal reservoir built into the bottom of the unit; an access door at the rear is said to make cleaning and refilling simple.

Various size units can be supplied, either hand-operated or motorized, to suit a large variety of conditions. For example, another unit reportedly provides a table-like mounting surface for the workpieces being tested. *Planet Products Corp.*

Circle P-8 on page 81 for more data

(*Turn to page* 130, *please*)

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

USE THIS POSTCARD

FREE LITERATURE

Protective Coating

Ready for distribution is a four-page leaflet on Westcoat hot-melt strippable coating for protecting metal parts against rust and abrasion. Automotive and aviation applications are numerous. *Western Coating Co.*

Circle L-1 on postcard for free copy

Metal Shot

Technical Bulletin No. 5 describes the increasing use of metal shot as weighting or back-up material, particularly in shell molding. Drawings and diagrams illustrate the text. *Harrison Abrasive Div., Metals Disintegrating Co.*

Circle L-2 on postcard for free copy

Aircraft Bonding Process

Fresh off the press is a 98-page booklet on the assembly of aircraft components by the Redux bonding process. Tables, charts, and photographs are used extensively to illustrate the text. *Ciba Co., Inc.*

Circle L-3 on postcard for free copy

Torque Converters

Bulletin No. 501 describes the advantages of truck-type, three-stage hydraulic torque converter drives for heavy hauling. Two models (DF and CF) are offered. *Hydraulic Div., Twin Disc Clutch Co.*

Circle L-4 on postcard for free copy

Carbide Dies

Catalog No. D-130 describes a complete line of carbide dies for wire, bar, and tube drawing. A standard wire gage table, split gage table in decimal sizes, and a table of decimal equivalents are included in the 30-page booklet. *Carboloy Dept., General Electric Co.*

Circle L-5 on postcard for free copy

Test Methods

Eighty different methods for testing, inspecting, and analyzing some 90 different types of products are listed in a folder now being distributed. Emphasis is placed on facilities for performing these services in the field, in the client's plant, or at the ASTB laboratories. *American Standards Testing Bureau, Inc.*

Circle L-6 on postcard for free copy

Melting Furnaces

Bulletin No. 310 covers the complete line of Lindberg-Fisher gas and oil-fired aluminum melting furnaces. Their uses and specifications are given. *Lindberg Engineering Co.*

Circle L-7 on postcard for free copy

Drill Presses

Recently issued is a 12-page catalog (No. 5206) covering a line of drill presses. *South Bend Lathe Works.*

Circle L-8 on postcard for free copy

(Please turn page)

THIS POSTCARD VOID AFTER APRIL 1, 1953

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2/1/53

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L-1	L-7	L-13	L-19	E-1	E-7	E-13	E-19	P-1	P-7	P-13	P-19	P-25
L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
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Double Crank Presses

Bulletin No. 65-B describes the Inclinable Series "BI" and Non-Inclinable Series "B" of gap frame double crank presses. Included are data on a new air-actuated electrically controlled sleeve clutch. *Niagara Machine & Tool Works.*

Circle L-9 on postcard for free copy

Broaching Machines

Currently being offered is a booklet on both vertical and horizontal broaching machines for many applications. *The LaPointe Machine Tool Co.*

Circle L-10 on postcard for free copy

Micarta Applications

Now available is a booklet which describes the numerous uses of Micarta in the aircraft, automotive, machine tool, and other industries. *Westinghouse Electric Corp.*

Circle L-11 on postcard for free copy

Silicone Rubber

Featured in a 23-page booklet are properties and applications, available classes, and design specifications of silicone rubber. *Silicone Products Dept., General Electric Co.*

Circle L-12 on postcard for free copy

Shipping Containers

Now available is a brochure on Superstrong wirebound, wooden, or corrugated containers to meet all types of packaging needs. *Rathborne, Hair and Ridgway Box Co.*

Circle L-13 on postcard for free copy

USE THIS POSTCARD

Iron and Steel Pickling

Bulletin No. 13 describes the application of "Rodine" to the efficient pickling of iron and steel. *American Chemical Paint Co.*

Circle L-14 on postcard for free copy

Surface Coating

Technical Release No. 12 contains latest information on specifications, formulations, and uses of vinylite resin VMCH as a surface coating. Several applications are described. *Bakelite Co.*

Circle L-15 on postcard for free copy

Drill Presses

Catalog Section Nos. A-1, A-2, and A-3 describe the 1200, 1300, and 1100 Series, respectively, of drill presses. Both single and multiple spindle models are available. Section No. A-4 covers radial drill presses. *Walker-Turner Div., Kearney & Trecker Corp.*

Circle L-16 on postcard for free copy

Cutting Tools

Catalog No. 101 contains unit price and dimensional information on all Illinite standard cutting tools. They are illustrated and indexed for easy reference. *Illinois Tool Works.*

Circle L-17 on postcard for free copy

Machine Tools

Recently released is a bulletin on the machine tool exposition held last fall in Hannover, Germany. Many of the tools exhibited are described and illustrated. *George Scherr Co., Inc.*

Circle L-18 on postcard for free copy

Speed-Reduction Drives

Now available is a 20-page speed-reduction drive catalog featuring the Shaft-King units. Drawings illustrate details of construction. *The American Pulley Co.*

Circle L-19 on postcard for free copy

Brake Linings

Catalog No. A-53 contains latest available brake lining specifications for domestic cars, commercial vehicles, and some makes of foreign cars. Each part number is cross-indexed. *American Brakeblok Div., American Brake Shoe Co.*

Circle L-20 on postcard for free copy

Inspection Equipment

Now available is an eight-page bulletin listing a selection of equipment for high standard inspection. Over 80 items are arranged for easy reference. *Arthur S. La Pine & Co.*

Circle L-21 on postcard for free copy

(See preceding page)

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L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24	P-6	P-12	P-18	P-24	P-30

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SCHWITZER-CUMMINS COMPANY

Specialists in COOLING FANS

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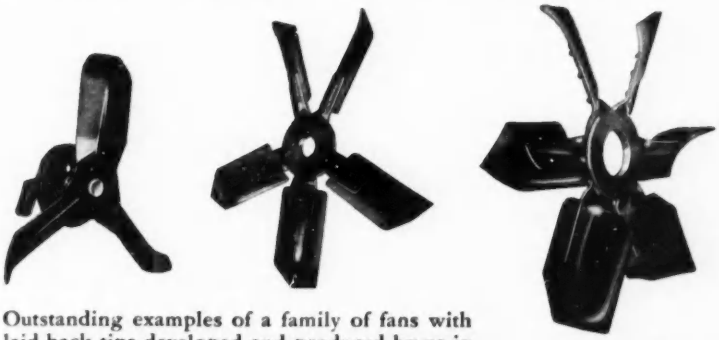
For over a third of a century we have been suppliers of cooling fans to the automotive industry; in many cases the chief supplier to whole divisions within the industry. For instance, today practically all leading engines in the fast growing Diesel field carry Schwitzer-Cummins fans along with other Schwitzer-Cummins products.

Pictured at the left is a 40″ diameter heavy duty fan used on several large capacity oil engines and for stationary applications as well.

A thermostatically controlled fan, simplified and with many advantages for applications where a rate of cooling variable with the work is desirable, is a recent field-proven development of our own engineering.



Outstanding examples of a family of fans with laid-back tips developed and produced by us in many sizes and capacities. Illustrated are 18″ diameter three blades—21″ diameter five blades—26″ diameter six blades.

We will apply the experience and skill of a lifetime of building and engineering cooling fans to your problem. We'll appreciate your inquiries.

OTHER PRODUCTS

- OIL PUMPS
- WATER PUMPS
- SUPERCHARGERS
- VIBRATION DAMPERS
- AUTOMATIC SHAFT SEALS

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1125 MASSACHUSETTS AVENUE
INDIANAPOLIS 7, INDIANA, U.S.A.

NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81

Piston-Type Pressure Switch for Many Ranges

Recently placed on the market is a piston-type, multi-range pressure switch which reportedly will operate satisfactorily between −65 F and 250 F. Its calibrations are said not to be affected by acceleration, shock, vibration, or excessive pressure surges.

The 600 series switch, which can be supplied to operate in any one of eight different ranges varying from 125 to 7500 psi, is claimed to be adjustable within any single range. It is constructed of aluminum die casting and stainless steel for durability.

Bobrick pressure switch

The switch is said to be designed for use in warning signals, in sequencing circuits, in interlocking controls, and in other similar applications. The manufacturer states that it is also suitable for control in medium and high-pressure systems using either hydraulic fluids, water, air, or gas.

Gross weight of the switch is from 14 to 16 oz, depending on pressure range and electrical connections. *Bobrick Manufacturing Corp.*

Circle P-1 on page 81 for more data

Silicone Rubber for Extreme Conditions

Recently announced is a silicone rubber that is said to remain flexible at −120 F and which can be produced with uniform high quality. Designated SE-550, this medium-durometer rubber is expected to have wide application for gaskets and seals on fuselage equipment of high-flying aircraft as well as for wire insulation on ignition systems of arctic ground equipment.

The compound is easily worked by rubber fabricators, according to the manufacturer. It is removed from the container with no difficulty, mills and extrudes easily, and has good tear strength that permits stripping from hot molds.

Said to be versatile also as a base stock, it can be colored with a wide range of heat-stable pigments. *Chemical Div., General Electric Co.*

Circle P-2 on page 81 for more data

Brake Lining for High-Temperature Stability

Recently placed in production is a Cerametallic brake lining that is said to be capable of stable, long-life operation at high temperatures. Grabbing and fading are reportedly eliminated.

The lining is a friction material using a ceramic, rather than a resin base, in which other ingredients are compounded to remain inherently stable at high temperatures. The material is retained in shallow metal cups which take the form of separate discs that are attached to the brake stators by a method which requires no rivets or bonding process.

Bendix brake lining.

On the back of each lining disc is an attachment device in the form of a projecting button. This button extends through a hole in the brake stator, and into a mating button on a disc on the opposite side.

By pressing the discs together one attachment device expands within the other, holding the two discs securely together, with the stator clamped in between. It is claimed that delining can be easily accomplished with simple hand tools. *Aviation Section, Bendix Products Div., Bendix Aviation Corp.*

Circle P-3 on page 81 for more data

Accessories Kit

Recently announced is an accessories kit, No. EST-104, for use with aircraft starter test stand Model JH 10600.

This prony brake test stand is said to test the performance and clutch setting (holding torque) of all models of aircraft reciprocating engine starters types I, II, III and IV with either six or seven-in. pads. A torquemeter with a range of 0 to 1500 ft lb is provided with the test stand.

The kit is for testing actuators and retraction motors. It includes such items as: an adapter ring to mate with the retraction motor and actuator mounting flanges; clamp extensions; two torquemeters with a range of 0-150 and 0-500 ft lb; and a tachometer gear reduction unit. *Greer Hydraulics, Inc.*

Circle P-4 on page 81 for more data

STERLING'S NEW

CONFORMATIC*

PISTON

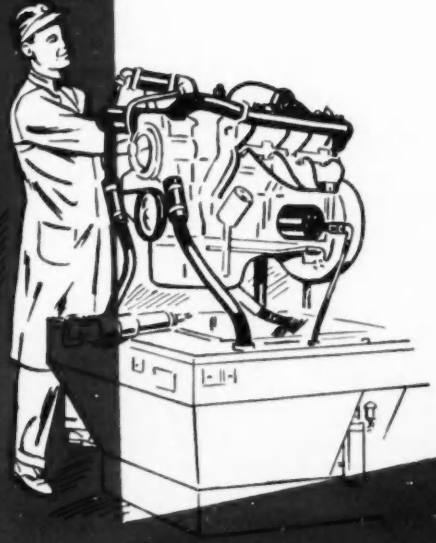
THIS STEEL TENSION MEMBER

Maintains fitting clearance from −20° F. to 200° F.

Can Be Safely Fitted to .001 Clearance, or Less . . . Without Danger of Scuffing or Seizing

You get quieter engines, eliminate cold slap and reduce friction . . . without sacrificing piston strength or conductivity. No cold slap at temperatures as low as −20° F. . . . no seizing or scuffing at 200° F.

LOOK AT THESE TEST RESULTS . . .



RESULTS OF 1200 Hour CYCLE TEST

In recent cycle tests made by one of the largest automotive manufacturers, Sterling *Conformatic* pistons were fitted into a stock engine at .0005 clearance. After operating the engine for 1200 hours, approximately half of that time at full load and full throttle, *the Conformatic Pistons were pronounced perfect.*

STERLING
PISTONS

*U. S. Pats., Patents Applied for

STERLING ALUMINUM PRODUCTS, INC. • St. Louis, Missouri

METALS

Ceiling Price of Nickel Raised to 60 Cents per Pound. Supplies of Tungsten, Manganese, Cobalt Have Improved

By William F. Boericke

Steel at Record Level

In other years, the pattern for the steel industry has been to slow up in January, speed up in February and reach a peak in March. This year has not started that way. The steel pace still holds to December's record levels. Based on its capacity level estimated now at 117 million tons annually, operations in early January were at 98.5 per cent capacity. In previous weeks, the rates were around 98-99 per cent if figured on the new rate.

Trade magazines point out that steel demand has continued near the boiling point in spite of the Christmas holidays. Backlogs and incoming orders both indicate that it will take considerable time before steel activity drops significantly. In especially tight supply are heavy plates and structurals, large bars and nickel stainless steel. Easier to obtain are chrome stainless, wire and wire products.

Steel executives have not altered their optimistic forecasts for the year although some are more confident than others. U. S. Steel's Fairless is quoted as saying that consumers' stocks appear unbalanced, but will get back to normal in the second quarter. Republic Steel's White admits his company may cut its operating rate to 95 per cent in the second quarter and to 80 per cent by the end of the fourth quarter. National Steel's Weir says no recession of any consequence is ahead. Colorado Fuel & Iron's Franz declares good business is assured his company through the third quarter, with a possible tapering off at the end of the year. Jones & Laughlin's Morrell, however, declares it is inconceivable the industry can operate indefinitely at capacity, and foresees highly competitive times ahead.

Conditions continue favorable for sustained high production. In spite of stoppage of Lake shipping during the steel strike enough iron ore has been brought down to keep the blast furnaces operating through the winter months until the shipping season reopens. Stocks of steel scrap are huge. Manganese ore supplies are adequate and the price is easing.

Yet, some uneasiness is visible. Weakness in lead and zinc prices, often forerunners of a slower industrial tempo, has caused worry, and there is growing apprehension over appearance of foreign steel in Canadian and even into Eastern seaboard states, with price cuts in evidence. Further cuts are expected as steel becomes more plentiful both here and abroad.

Price of Nickel Increased

The Economic Stabilization Agency has approved a 3½¢ ceiling price increase for nickel to 60¢ per lb. This was in line with the boost allowed by the Canadian government. While it is known that Washington was extremely loath to break the price line, there was nothing it could do about it as the International Nickel Co., which negotiated the price increase and supplies nearly all of the American demand, is a Canadian corporation and is not bound except by courtesy to conform to domestic price controls. Inasmuch as 95 per cent of Canada's nickel output is sold outside the Dominion, it may readily be inferred that opposition in Ottawa to the price boost was not vociferous.

While there is considerable justification for the six per cent increase in the nickel price from the level established in 1951 because of higher operating costs, there is little chance that the higher price will result in larger production of nickel. The metal is still listed on the "most critical" list with small chance for any improved supply until 1954, and then only in relatively small amount.

More Tungsten, Manganese and Cobalt

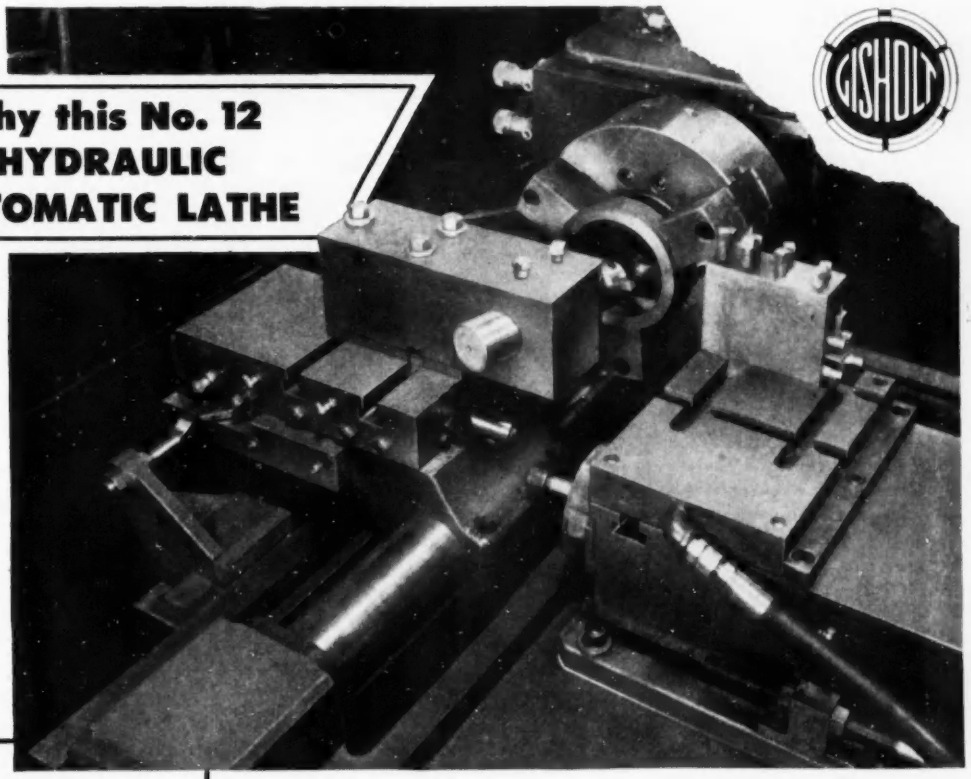
On the other hand, supplies of three other scarce metals have improved so much that they may shortly be removed from the critical list. The International Materials Conference has announced it is discontinuing the international allocation of tungsten because production has increased 50 per cent with supply and demand now virtually in balance. This is indicated in progressive price softening in the open market, where tungsten oxide is now quoted nominally about $48 per unit, contrasted with $65-$70 per unit a year ago. In the United States, mine production has increased appreciably thanks to a guaranteed price of $65 per unit, which will not expire for another 3½ years.

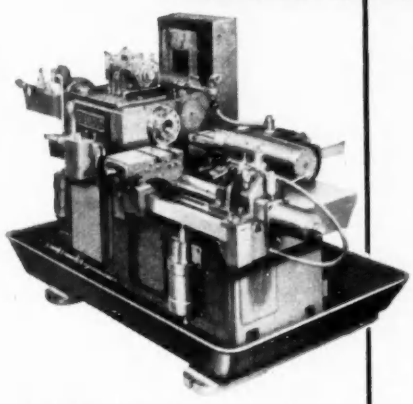
Manganese ore similarly is in easier supply. Nominally still quoted about $1.18 per long ton unit, contracts at this price are hard to obtain from domestic buyers. Announcement that the Export-Import Bank has advanced $67.5 million for production of 5,500,000 tons of manganese ore, with a guaranteed floor price of 65¢ per unit, is a tip-off on the long term price trend and is in interesting contrast to the $2.30 per unit offered for new domestic production.

The present price of cobalt would hardly continue if it were not for military demand. Civilian require-

(*Turn to page* 104, *please*)

why this No. 12 HYDRAULIC AUTOMATIC LATHE





The Gisholt Hydraulic Automatic Lathe is a genuinely rugged 12" lathe, suited for light, fast jobs. Handles chucking, between centers, or fixture-held work.

maintains GREATER ACCURACY

Here, feed pressures are applied directly to tools without intermediate cams, arms or other linkage. Accuracy is further insured by feeding against dead stops. In all cuts there is a moment of dwell during which cuts are cleaned up.

Front carriage is mounted on and driven by the massive bar to which it is clamped. Wide lateral support of carriage assures rigid alignment without tremble or tremor.

Movement of the massive rear slide is by hydraulic piston in the base of the slide itself.

Both carriages are directly supported by the massive integrally cast cabinet type bed, and all bearing surfaces, ways and gibs are hardened and ground steel to assure permanent accuracy.

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Observations

By Joseph Geschelin

Engine Lubrication

With little fanfare the splash feed lubricated engine has almost disappeared from the scene. Chevrolet's new 115 hp engine for use with Powerglide in passenger cars has pressure feed lubrication. It should account for at least 40 per cent of Chevrolet production in '53. The conventional Chevrolet engine will be continued in passenger car and truck production. At the same time, the Hudson announcement listed '53 models as including the Hornet, Wasp, and Super Wasp in the regular line. No mention was made of the Commodore Series. It has disappeared and with it the familiar Hudson Eight which had splash lubrication.

Chevrolet Engines

It may be taken for granted that Chevrolet has been experimenting with V-8's as well as V-6 engines in recent years. Judging by what we hear, the V-6 is pretty much out of the picture. The V-8 certainly is under consideration, but there is no indication that it will be released for production during the next few model years.

Automatic Drives

Now that both Chevrolet and Buick have announced automatic drives incorporating a low starting gear requiring no manual operation, for quick-acceleration starts, practically all drives have this feature today, with but a single exception. It is our guess that in another year all makes will offer automatic drive as optional equipment.

New Bodies

'Fifty-three is a big year for entirely new bodies. In General Motors, Chevrolet and Pontiac have newly styled bodies, bigger and roomier. Willys-Overland has new four-door models and hardtops. The Hudson Jet and Super Jet bodies are new. New bodies and styling predominate in Chrysler Corp. division and Studebaker has just announced completely new body styling.

Power Steering

Although power steering is relatively new, four different versions already are available in 1953. They include: Saginaw, Gemmer, Bendix attachment type, and the distinctive mechanical system on Studebaker which is supplied by Warner Gear. Now available on Chevrolet, power steering should make a sensational production record in '53, considering its extra cost.

Tubeless Tires

Our quick survey last fall on tubeless tires was more successful than a statistical sampling. It is quite definite that no production car for '53 has offered tubeless tires. Whether or not they will appear on '54 models is a matter for conjecture at this writing. One thing is certain, all major tire producers will have to have an acceptable product simultaneously before passenger car manufacturers make a decision. In any event, the tubeless tire is a live project for the coming year.

Machine Tools

Continuing stretch-out of military programs is bound to have an effect upon machine tool order boards and some machine tool builders are worried about business for '53. Indications are that new plants as well as modernization programs in the automotive industries will be effective in taking up what slack there may be. As a matter of fact, some of the new projects going into operation still lack a lot of new equipment. The production of these machines alone is a major project for a number of machine tool builders. Since the automotive producers are forced to rely upon temporary machines where new transfer equipment remains undelivered, any slack in machine tool order boards should be helpful in these cases.

High Strength Alloys Subject of Seminar

A seminar on ultra-high strength alloy steels for aircraft and automobiles will be held by the SAE Southern California section at the Western Metal Congress which runs Mar. 23-27 in Los Angeles, Calif.

Topics will be "Materials and Metallurgy," "Fabrication and Processing" and "Design Considerations," for three successive sessions.

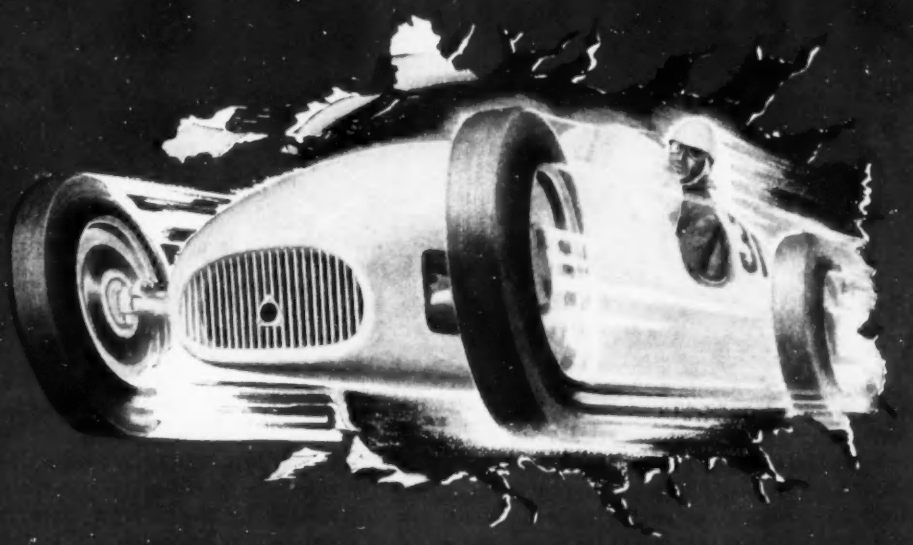
The SAE seminar brings to six the number of engineering societies which will hold technical sessions at the Congress. Others are American Society for Metals and western sections of American Welding Society, Society for Non-Destructive Testing, American Foundrymen's Society and American Institute of Mining and Metallurgical Engineers — Metals Branch.

These societies and 14 others are cooperating with American Society for Metals in presenting the Congress in the Hotel Statler and the Western Metal Exposition, which will run Mar. 23-27 in Los Angeles' Pan-Pacific auditorium. The exposition will have more than 300 exhibitors and will be devoted to production, fabrication and application of metals.

Death Takes Founder of Campbell-Ewald

Henry T. Ewald, board chairman of Campbell-Ewald Co., died in Detroit Jan. 9. He was 67 years old. Mr. Ewald was a pioneer in automobile advertising and operated his own agency for a longer continuous period than any other man in the business. Prior to forming Campbell-Ewald in 1911 in partnership with the late Frank Campbell, he had served as assistant advertising manager of Studebaker and advertising manager of the old E-M-F Company. He was widely known for his philanthropic activities.

clean sweep!



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PISTON RINGS

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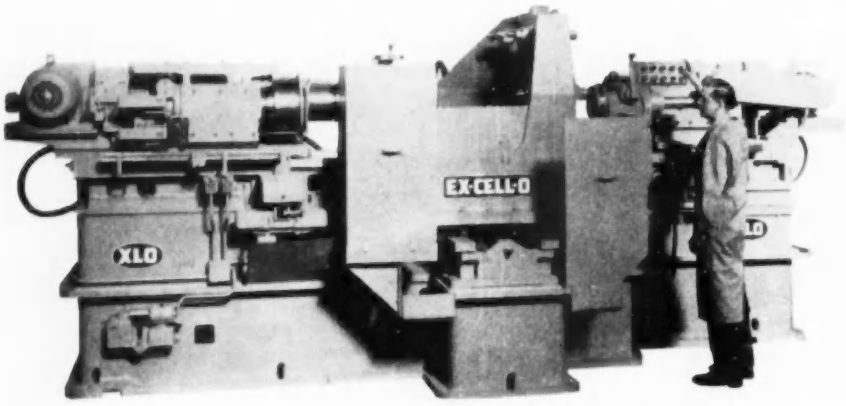
June 8	Milwaukee, Wis.	100 Miles	Mike Nazaruk
July 4	Raleigh, N. C.	200 Miles	Troy Ruttman
Aug. 16	Springfield, Ill.	100 Miles	Bill Schindler
Aug. 24	Milwaukee, Wis.	200 Miles	Chuck Stevenson
Aug. 30	Detroit, Mich.	100 Miles	Bill Vukovich
Sept. 1	DuQuoin, Ill.	100 Miles	Chuck Stevenson
Sept. 1	Pikes Peak, Colo.		George Hammond
Sept. 6	Syracuse, N. Y.	100 Miles	Jack McGrath
Sept. 8	Denver, Colo.	100 Miles	Bill Vukovich
Nov. 2	San Jose, Calif.	100 Miles	Bobby Ball
Nov. 11	Phoenix, Ariz.	100 Miles	Johnny Parsons

What does this mean to you? Just this... under even the most severe wear conditions, you can expect championship performance with Perfect Circle piston rings!

Because of the new standards of performance set by Perfect Circle chrome rings, they are approved by 25 of the 27 leading engine manufacturers using chrome rings as original equipment. Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., Toronto, Ontario.

Automatic Boring Machine for Jet Engine Components



Ex-Cell-O special precision boring machine.

A SPECIALLY-DESIGNED, 19-ton machine tool that cuts 87 per cent off the time previously required to perform all internal machining on J47 jet engine aft frames was installed recently at the San Diego plant of Solar Aircraft Co. The new unit, known as a two-station, three-head transfer boring and facing machine, is said to be the only one of its type in the world. It was designed by Solar engineers and built by the Ex-Cello-O Corp., of Detroit.

The machine has a welded steel base supporting two opposed spindle slides and a central fixture. Spindle slides are of standard Ex-Cell-O design with hardened steel ways. The left slide carries two heavy-duty precision boring spindles; the right slide carries one. The left rear spindle has a projection which reaches inside to finish surfaces near the center of the long part. All spindles have cross feed heads for feed-facing operations.

Workpieces are stainless steel frame assemblies requiring work on three areas, one at each end and one at the center. One of the problems is to maintain concentricity of the bores in the large workpiece, which is not too rigid.

The fixture indexes between forward and rear positions. In the forward position the part is loaded, located by means of a large retractable plug, then clamped hydraulically. The operator withdraws the locating plug and presses the start button.

The work cycle is entirely automatic. The left slide advances and the left front spindle counterbores and faces the flange at the left end, then retracts. The fixture indexes to the rear, then the spindle slides advance simultaneously from both sides, the left rear spindle performing operations in the center of the part while the right spindle bores, counterbores and faces surfaces on the right end. Safety switches prevent operation of the machine until the part is properly clamped, locator withdrawn and fixture properly indexed.

Complete floor-to-floor cycle time is 30 minutes, about 13 per cent of the time previously required.

• • •

Tractor Firm Formed in France

A new company under the title Société Standard-Hotchkiss has been formed in France and has taken over the portion of the Hotchkiss factory at St. Denis which, before the war, was used for the production of tanks. The immediate program is the production in France of the Ferguson tractor which, at the outset, will be assembled with parts produced by Standard Motor Co. of Coventry, but which eventually will be manufactured entirely in France.

Government permission will have to be obtained for importation of parts from the Standard works. It is stated that the eventual annual target is an output of 25,000 tractors at the rate of 100 per day. Production and storage space at present available at the Hotchkiss works is 74,000 sq ft. Total French tractor production in 1952 was 28,000 and under the Monnet plan production should reach 40,000 in 1953.

The development is on a partnership basis, under which it is believed Hotchkiss has a 51 per cent interest.

A Hotchkiss spokesman stated that this move would not in any way affect Hotchkiss passenger car and light truck production. This is one of the oldest of the French concerns, the automobile division having been opened in 1904, as a development from a gun factory established in 1870 by John Hotchkiss, an American citizen. From Standard headquarters comes the announcement that the new company has in mind that its activities could be further extended in the future to cover the manufacture in France of motor cars to the design of models produced by the Standard Motor Co.

THE BOX KITE PLANES of fifty years ago had engines so small a man could lift one single handed. Modern flying box cars carry freight-car loads across the continent in a few hours. Bigger engines with minimum weight per horse-power are required. The performance of every part must be taken for granted—therefore must be flawless and precision made. The Special Products Division at Thompson Products specializes in making such parts.

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Valve Seat Insert for aircraft engine

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SPECIAL PRODUCTS DIVISION

Wing Planforms for Supersonic Speeds

(*Continued from page 63*)

Sketches of the complete configurations are shown in Fig. 9.

An indication of the high-speed capabilities at 35,000 ft is shown in graphical form in Fig. 10. It is apparent that only the delta configuration shows promise of supersonic speeds.

Next of importance after the desired performance characteristics have been obtained are the airplane handling characteristics.

The static longitudinal characteristics are very little different for the straight and swept-wing airplanes in the low-speed region and at low angles of attack. An essential difference between the delta wing and the two airplanes having horizontal tail surfaces is that it is not possible to maintain a high value of static-stability margin and center-of-gravity travel because of the limited trimming power of the longitudinal-control surfaces. For example, if the same degree of static stability is provided in the delta wing as in the other two types of airplane, the usable maximum lift coefficient is reduced considerably.

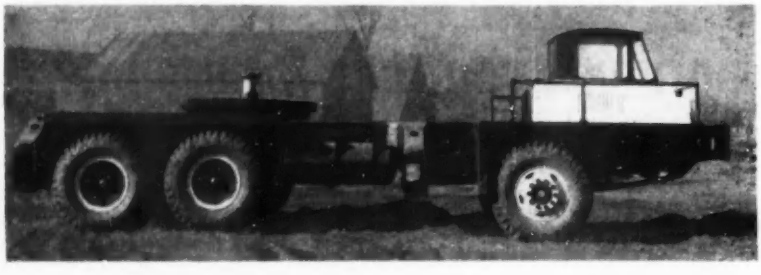
Variation of static stability with Mach number (Fig. 11) is most pronounced for the straight-wing airplane. The stability usually tends to decrease as the airplane approaches its critical Mach number, then increase rapidly in the transonic region, and remain high at supersonic speeds. This large change in stability complicates the problem of control of supersonic airplanes and makes irreversible power controls almost a necessity if maneuverability is to be maintained at these speeds.

The sweptback-wing airplane exhibits a similar trend of increased stability just below Mach number 1.0, but usually fails to develop any loss in stability at high-subsonic speeds. The increase with Mach number is somewhat more gradual and of somewhat smaller magnitude than that of a straight wing. Both of these effects occur because a portion of the swept wing is always operating subsonically, even though the airplane speeds are supersonic. The delta-wing airplane shows the most gradual change in stability with changing speed, but even here the stability at supersonic speeds is several times that at subsonic speeds.

One of the important differences between conventional airplane configurations with horizontal tails, such as either the straight or sweptback-wing configuration under consideration, and the delta type is that the conventional type actually increases longitudinal damping in the vicinity of Mach number 1.0, whereas the delta configuration tends to show a region of reduced damping at slightly supersonic Mach numbers. (Fig. 12.)

Although this condition is not known to be dangerous, it would have an adverse effect on the utility of the airplane as a gun platform or sighting station. Of course, cures for this type of trouble can be effected by the use of a longitudinal-pitch damper, to check longitudinal motions. (*Turn to page 94, please*)

GIANTS..



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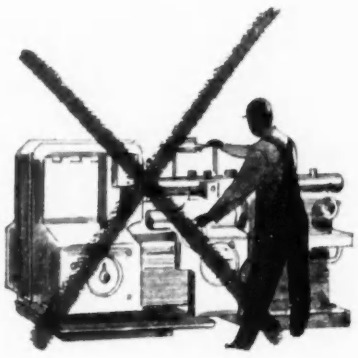

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Wing Planforms

(*Continued from page 92*)

While objectionable lateral-directional characteristics or "dutch roll" oscillations may occur in any of the airplane configurations under consideration, the use of the swept or delta-type wing tends to aggravate this type of oscillation. The reason for this is shown in Figs. 13 and 14. The first of these shows that a straight-wing airplane has no variation in effective dihedral with lift coefficient, thereby making it possible to fit the configuration for a small amount of positive dihedral at high speeds and retain the effective dihedral throughout the speed range. In contrast, both the sweptback-wing and delta-wing airplanes exhibit a large increase in effective dihedral with lift coefficient. Thus, if a small effective dihedral is shown at high speeds, the effective dihedral at high lift coefficient or low speeds, or even high speed at high altitude, disturbs the normal relation between effective dihedral and directional stability.

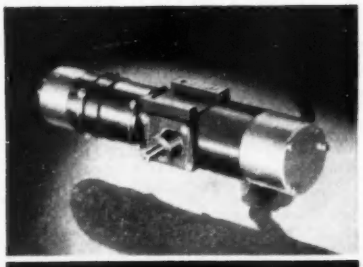
Although the seriousness of the problem of lateral-directional oscillations can be minimized by proper choice of a configuration, conflicting requirements may make these choices impossible. Items that may improve the situation however, are minimum value for wing incidence, low-wing configuration, etc.

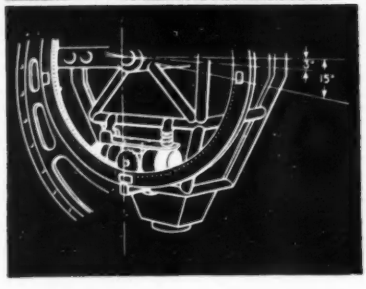
For most high-speed airplanes, it is necessary to resort to the use of a mechanical device known as a yaw damper, which essentially consists of a rate gyro that transmits a signal to a servo that operates the rudder in a direction such as to oppose the yawing motion.

At low speeds lateral-control characteristics of a sweptback-wing airplane are generally poorer than those of a straight-wing airplane and about the same as those of a delta wing. At high speeds the delta wing's superiority is due to smaller wing twist.

The usable maximum lift characteristics differ considerably for the different airplane configurations as shown in Fig. 15. In general, the straight wing has the highest maximum lift at low speeds but exhibits the most rapid fall off with Mach number up to a value somewhat less than M = 1. The maximum lift coefficient then increases to its highest value just above Mach number 1.0 and then decreases gradually. In the supersonic region the highest value is

Cameras on Reconnaissance Planes Airborne Actuated





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The R-118M6 is a modification of the Rotorac shown in the I. A. S. Aeronautical Engineering Catalog. We suggest you refer to this publication for data on this and other Airborne actuators.

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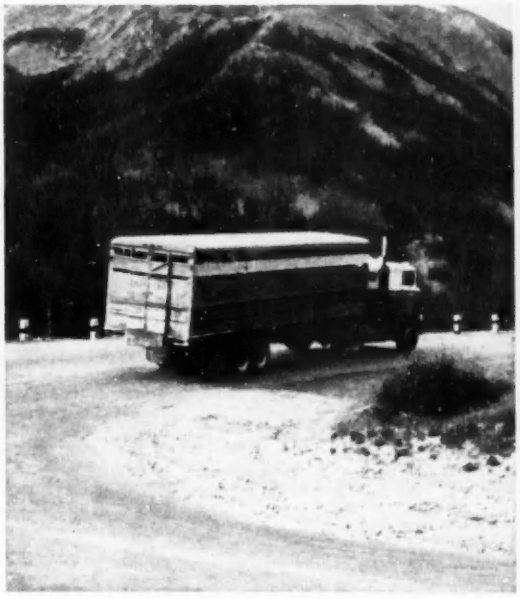

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obtainable only if the airplane is equipped with an all-movable horizontal-tail surface. Considerable trouble is experienced in attaining maximum lift if only adjustable stabilizer and elevators are available. The maximum lift coefficient of the swept-wing airplane is somewhat lower than that of the straight-wing airplane at low Mach numbers; it increases at low-supersonic Mach numbers and then decreases gradually with Mach number. Here again, the maximum values are obtainable only with all-movable horizontal-tail surfaces. The delta-wing airplane maintains a constant value of maximum lift coefficient throughout the major portion of the subsonic range, primarily because the maximum usable lift coefficient is determined by the trimming power of the longitudinal-control surface. This deficiency in trimming power results in the smallest value of maximum lift coefficient of all three configurations throughout almost the entire speed range. Fortunately, the lower wing loading of the delta wing compensates for the lower value of maximum lift coefficient. Therefore, for maneuvers in the transonic and supersonic ranges it is superior to the conventional airplanes. The load factors developed during maneuvers using these maximum lift coefficients are shown in Fig. 16.

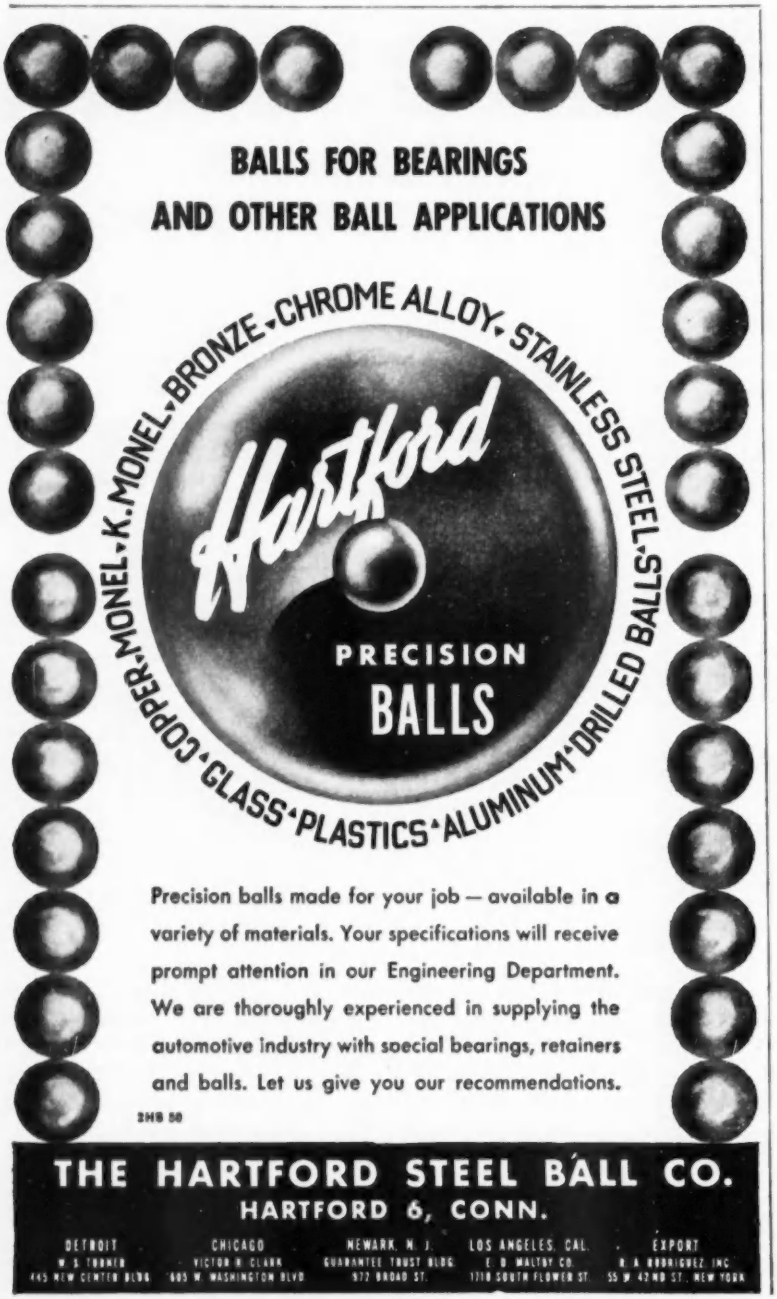
One of the main problems of the sweptback configurations is that of obtaining a high value of maximum lift coefficient with flaps down, yet maintaining sufficient longitudinal stability so that the airplane will pitch down at the stall. The most effective method of solving this problem on swept-wing airplanes is to use leading-edge slats. This is usually not necessary on a delta-type configuration because of the very low aspect ratio and resultant three-dimensional flow around the tips. In fact, in a delta-wing configuration it is possible to modify the longitudinal stability at the stall by means of suitable small changes in planform. And as mentioned in the discussion of static-longitudinal stability, it is important to maintain a small but adequate static-stability margin in order to achieve the highest possible value of maximum lift coefficient.

The very low lift-curve slope for the swept and delta configurations requires a high-nose-up attitude to attain maximum lift coefficient. See Fig. 17.

In the case of delta-wing airplanes, on which the use of landing flaps is impracticable, the situation is even worse. The required large increase in angle of attack makes the problem of visibility over the airplane nose a serious one and one that may be reflected in configuration changes that increase the drag at high speeds. For example, it requires the canopy to be placed far forward on the fuselage. The use of a high amount of wing incidence would, of course, be beneficial for this difficulty, but it aggravates dutch-roll oscillation during approach.

The use of sweep and low aspect ratio automatically produces an increase in drag for a given lift coefficient at the speeds for approach and landing (see Fig. 18). The result is higher sinking speeds and more difficulty in flaring during the landing procedure. This difference in landing characteristics may cause the pilot some concern. Probably the solution to this problem is to train the pilots to become accustomed to these new characteristics and to advocate the use of approach speeds somewhat higher than those now used.

(*Turn to page 98, please*)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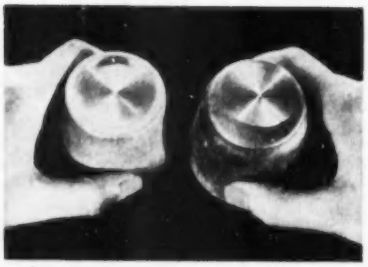

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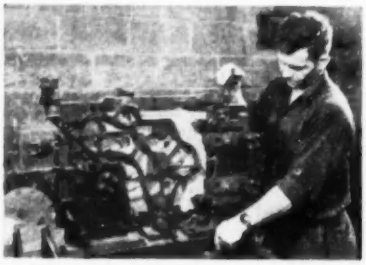

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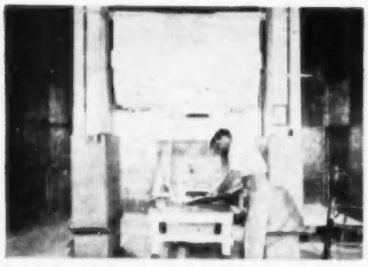

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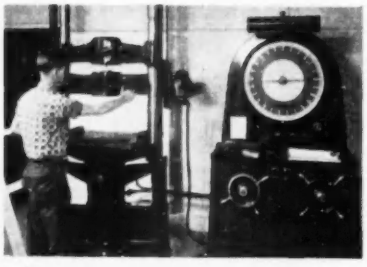

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(*Continued from page 96*)

Summary

To summarize, it can be concluded that although it is impossible to select one planform for all high-speed application, the swept and delta configurations offer speed advantages in the lower transonic range, and the delta offers the best possibility of achieving supersonic speeds with a given power plant. At very high supersonic speeds a thin, low-aspect ratio, straight wing may have some advantages.

With regard to handling characteristics, it is generally possible to make a relatively simple control system for the conventional straight-wing or swept-wing airplane, which employs a horizontal tail. The delta-wing airplane invariably requires the use of the more complex irreversible power controls. Some of the questions on the relative merits of the configuration studied will be answered only by flight tests.

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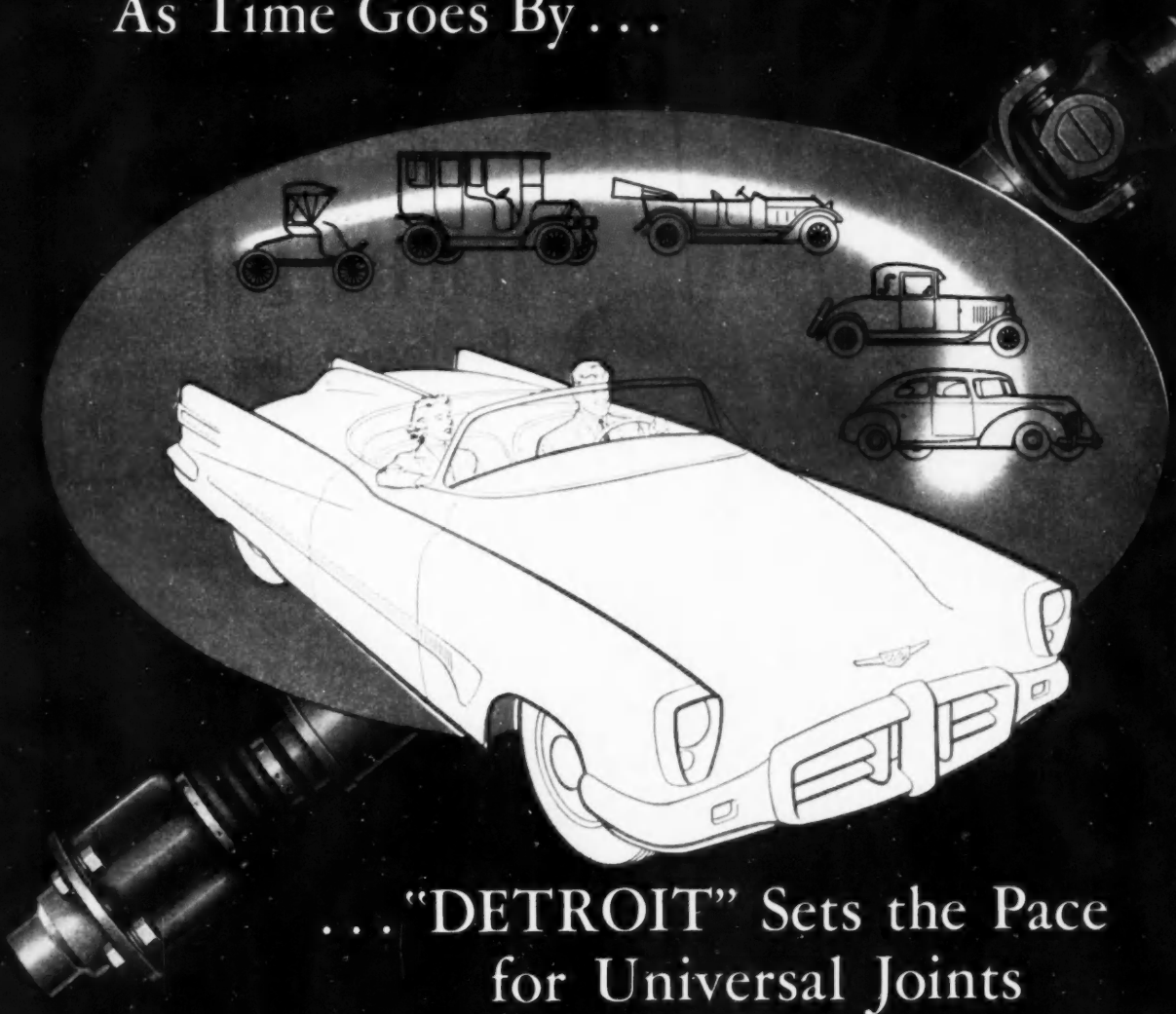
BOOKS . . .

MANUAL FOR FORD OWNERS, *by C. E. Packer, published by Popular Mechanics Press, 200 East Ontario St., Chicago, Ill. Price, $3.50.* Recently published as the third in a series of three on Chevrolet, Plymouth and Ford cars, this volume covers the operation and upkeep of the Ford automobile from bumper to bumper and is written as a guide to smooth performance, economical repairs and wise maintenance. Parts and the steps involved in making both large and small repairs are illustrated either by diagram, drawing, or photograph. According to the publishers, the complete manuscript was checked by Ford service department technicians, and the majority of the illustrations were furnished by Ford Motor Co. Included in the manual's 304 pages are such topics as: storage battery; spark plugs; ignition system; starter; generator; regulator; lighting; fuel system; engine maintenance; lubrication; cooling system; Synchromesh transmission; overdrive; Fordomatic transmission; brakes; tire care; and Ford accessories.

As Time Goes By . . .



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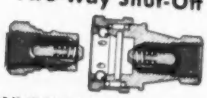

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Army Tank Facts

THE Army's postwar concept of tanks was for a family of three—a light, a medium, and a heavy—tentatively designated the T41, T42, and T43, respectively. Before all the components of the medium T42 could be thoroughly proved, the requirements of the rearmament program forced production of other mediums made up of proved components. The Army's newest tanks are:

T41 Light Gun Tank (Walker Bulldog)

This was the first completely new tank built by the Army since World War II. The existence of production models was publicly announced in March, 1951. The Walker Bulldog is fast and highly maneuverable, can turn in its own length, climb or descend 60 per cent (not degree) slopes. It is used to perform cavalry and reconnaissance missions. Its characteristics are:

Weight—26 tons.
Armament—76mm high-velocity gun; one .30 caliber and one .50 caliber machine guns.
Engine—500-hp, 6-cyl, air-cooled Ordnance-Continental
Transmission—Allison Cross Drive.
Steering—T-bar with hand grips.
Speed—In excess of 40 mph.
Crew—4 men (commander, gunner, loader, driver).
Made by Cadillac Division of GMC, Cleveland, Ohio.

M47 Medium Gun Tank (no name)

This was the first medium tank built since World War II. (The M46 Patton was a modification of the war-time Pershing.) The M47 was publicly unveiled in April, 1952. Production and development were done simultaneously, giving the Army completed M47's within 10 months after the decision to build. The decision to telescope research and production of a tank was unprecedented and resulted in a saving of over two years in delivery time. The M47 is a modified M46 Patton tank hull wedded to a new (T42) turret. A new rangefinder greatly increases the chances of a first-round hit against enemy targets. Its characteristics are:

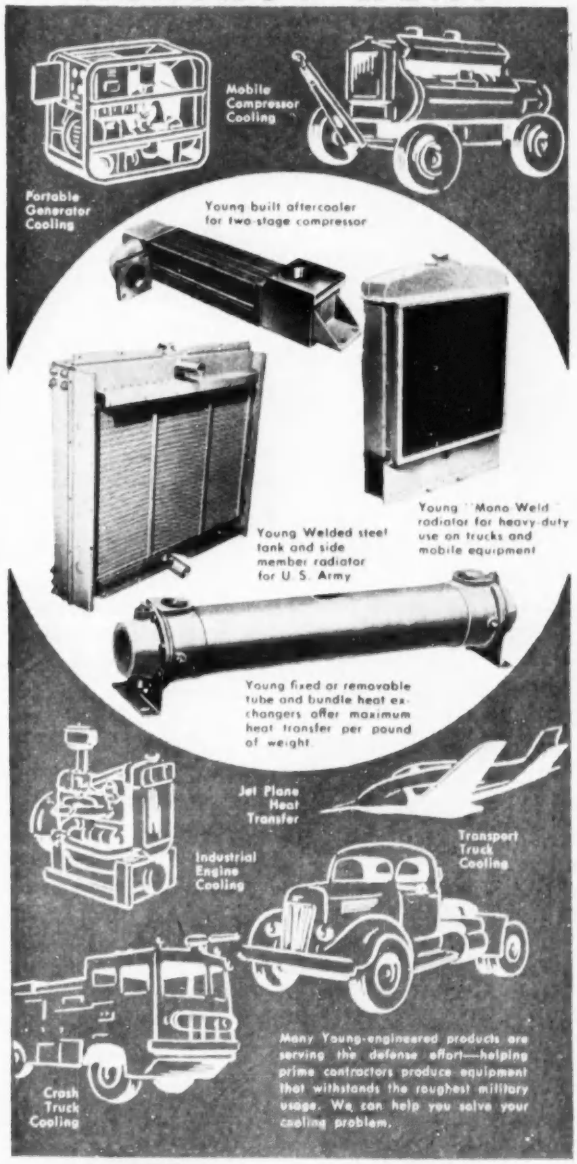
Weight—48 tons.
Armament—90mm high-velocity gun; two .30 caliber and one .50 caliber machine guns.
Sighting—T41 rangefinder.
Engine—810-hp, V-12, air-cooled, Ordnance-Continental.
Transmission—Allison Cross Drive.
Steering—Wobble stick.
Speed—In excess of 30 mph.
Crew—5 men (commander, gunner, loader, driver, and assistant driver).
Made by Detroit Arsenal, Detroit, Michigan; American Locomotive Company, Schenectady, N. Y.

T48 Medium Gun Tank (Patton 48)

This was the second and latest medium tank to go into production since World War II. Unlike the M47 which is a proved hull with a new turret, the T48 is new from the ground up, its design and development having been done in the postwar years. It was publicly announced in July, 1952. With a low silhouette and a hull and turret of one-piece cast armor, elliptical in design, it is extremely difficult for an enemy shell to hit and penetrate the sloping armor. Its characteristics are:

(*Turn to next page, please*)

YOUNG WORKS FOR DEFENSE AGAINST HEAT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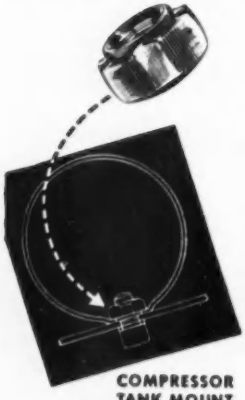

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Army Tank Facts

(*Continued from previous page*)

Weight—45-50 ton class.
Armament—90mm high-velocity gun with a "quick change" gun tube; two .30 caliber and one .50 caliber machine guns.
Sighting—Rangefinder.
Engine—810-hp, V-12, air-cooled, Ordnance-Continental.
Transmission—Allison Cross Drive.
Steering—"Power steering" wheel.
Speed—In excess of 30 mph.
Crew—4 men (commander, gunner, loader, driver).
Made by—Chrysler Corp., Newark, Delaware. Ford Motor Co., Livonia, Michigan. Fisher Body Div. of GMC, Grand Blanc, Michigan. American Locomotive Co., Schenectady, New York.

Employees Will Buy Cleveland Pneumatic

An unusual financial plan for employees of Cleveland Pneumatic Tool Co. to acquire, through their company-financed profit sharing trusts, 100 per cent ownership of the multi-million-dollar manufacturing company was laid before the 2700 workers recently.

The program permits payment for all of Cleveland Pneumatic's capital stock, over a 14-year period, by the two profit-sharing trusts, which are financed entirely by company contributions and are operated for the benefit of the hourly-paid and salaried employees. Of the total purchase price of $11.8 million, $2.15 million would be paid on closing of the deal, with the balance including interest to be spread over the remaining years.

Fifty-one per cent of the stock would be acquired by the profit-sharing trust for salaried employees. The remaining 49 per cent would go to the trust for hourly-paid workers.

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Interest High in GM Road Essay Contest

General Motors Corp. reports a highly favorable response to its Better Highways Awards Contest, announced several weeks ago. More than 100,000 requests have been received for entry blanks and information about the competition. In addition, several thousand actual entries have been received and the rate of entries is expected to increase sharply until the end of the contest **March 1.**

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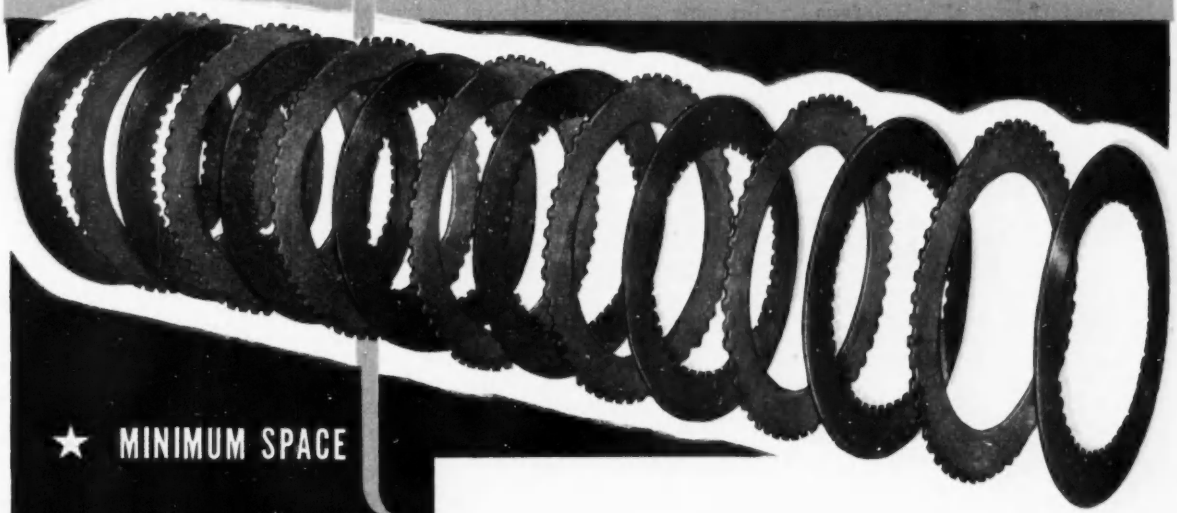

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METALS

(*Continued from page 86*)

ments alone would be amply satisfied with present supply. In Canada it is expected that the present price of $2 per lb for cobalt in concentrates will be cut back to the old price of $1.40 in February when the objective for the stockpile will have been reached.

Increased imports of cobalt from the Belgian Congo and Rhodesia have added to U. S. supplies and a 40 per cent increase is expected from the new cobalt refinery in Salt Lake when initial operational difficulties are finally solved. The metal is vital for production of operating parts of jet engines which must maintain their strength at very high temperatures.

Lead Demand Quiet As Year Opens

In less than three week's time (December 22-January 13) the lead price was changed five times. The price changes have not been violent, in the main ¼¢ per lb each time, but they have disrupted buyer's confidence in a stable market.

Selling on the London Metal Exchange was initially blamed for market weakness and it was cynically observed in trade circles that the morning cable from London had become the all-important event of the day. But firmness in London has not always brought similar conviction to the home market that was confronted with sharply increased shipments of secondary lead to the smelters. Even the protracted strike at the important Australian lead smelter at Port Pirie, which means a loss of about 18,000 tons per month of refined lead as long as continued, has brought only languid buying interest to the market. It is uncertain how long this buyers' apathy will continue.

It needs a spread of about 2¢ per lb between the London and the New York price before lead can move profitably from one market to the other after paying freight, tariff, and shipping charges. Domestic prices are adjusted promptly to prevent any extended selling in this market from abroad. In spite of its inauspicious beginning, prominent lead officials believe that lead consumption during the year will be satisfactory and bear a fixed relationship to general industrial activity.

Zinc Price Higher After London Opens Free Trading

When trading in zinc began on the London Metal Exchange on January 2 after a lapse of 13 years, the event had international significance. Zinc consumers both here and abroad had been deferring purchases to see if the price would drop below 11½¢ per lb at which Belgium had been offering the metal on the continent. It was a foregone conclusion it would be much less than the former controlled price of 13¾¢ to the British consumer.

A vast relief was felt when the first trade was made at 11½¢ with the market closing higher for the day. At this level, it was unprofitable to buy in London and ship to New York for resale. The cost would have been about 13¼¢ per lb after adding 0.7¢ duty and 0.75¢ freight to the London price. American zinc producers promptly moved up their price half a cent to 13¢ per lb and zinc stocks on the New York Stock Exchange advanced briskly.

Profiting by the unhappy memory of last summer when lead trading began on the London Metal Exchange and government metal was offered indiscriminately on the market at ter-

(*Turn to page 108, please*)

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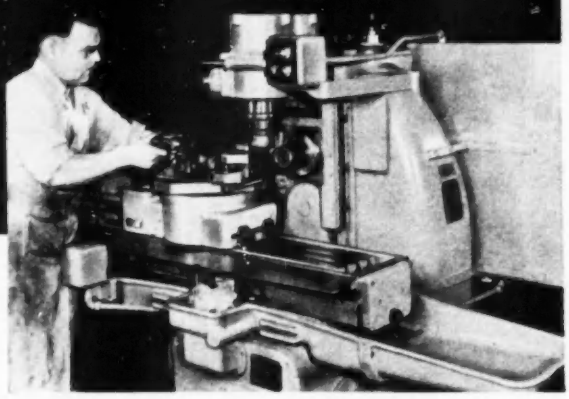
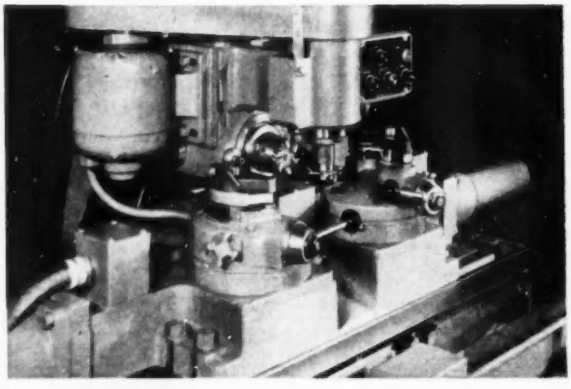


Special 2-Spindle Head Mills Top and Side of Part Simultaneously

This standard Sundstrand Rigidmil has a special head with one vertical and one horizontal spindle for milling two surfaces of refrigerator cylinders in one automatic cycle. Additional production is obtained by the two indexing fixtures, which permit loading of one part during the milling of another. Production is 150 parts per hour.



Face Milling and Slotting With Special 2-Spindle Head

This Sundstrand Rigidmil is provided with a special high speed head equipped with one vertical and one horizontal spindle. Each spindle has endwise adjustment, and horizontal spindle is provided with automatic retraction. Two power-operated rotary tables are timed and interlocked with the automatic table cycle for rotary milling of the face and slot in washing machine brake shoes. Manually clamped fixtures hold the part for a cycle of load and unload at one end while milling at opposite end. Production is approximately 145 per hour.

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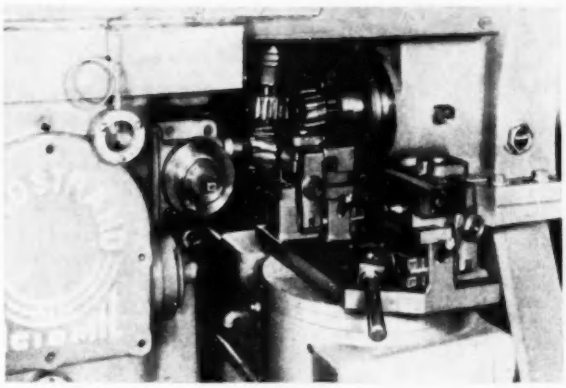
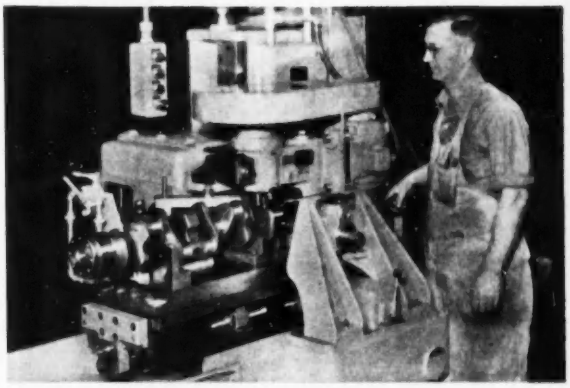


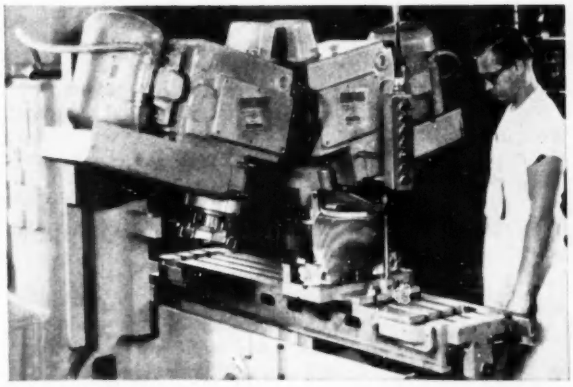
Three Sides of Part Milled Simultaneously With Special 3-Spindle Head

The standard Rigidmil above has a special head with one vertical spindle and two opposed horizontal spindles offset vertically. The top and both sides are milled in one automatic cycle. Not only are operations saved, but the three surfaces are held in accurate relation to each other. Again, automatic indexing of fixtures provides free loading time and helps obtain the production of 172 pieces per hour.



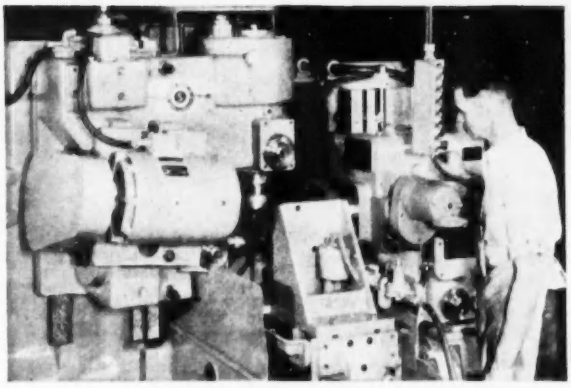
Straight and Woodruff Keyways Milled With Special 2-Spindle Head

Here's a standard Sundstrand Rigidmil "tooled" for a special keyway milling job. It is provided with a regular horizontal spindle head for milling a straight keyway and an attached pivoting head for milling a Woodruff keyway. Both keyways are located in one end of the crankshaft and both are milled simultaneously. Keyways are held in definite relation to each other by milling both in same setting of crankshaft.



Duplex Rigidmil Has Two Special Heads for Angular Milling Operations

This Sundstrand Duplex Rigidmil is equipped with two special heads for angular milling on aircraft cylinder heads. With workpiece inverted in fixture, the milling heads, one set at 10° and the other set at 15°, mill both rocker bosses simultaneously. The machine operating in automatic table cycle of rapid approach, feed and rapid return completes 64 cylinder heads per hour.



Duplex With One Special 2-Spindle Head Mills 3 Surfaces Simultaneously

A special two-spindle head is mounted on the left hand column of this standard Sundstrand Duplex Rigidmil. One is a vertical spindle and the other is set at 5° from horizontal. The right hand column carries a standard horizontal head. Pads on both sides and top of transmission cases are milled in automatic cycle at the rate of 67 pieces per hour.

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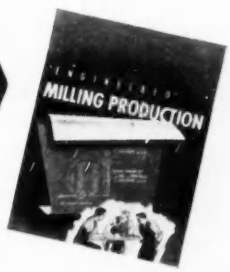

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METALS

(*Continued from page* 104)

rific losses, the British Ministry of Material had carefully indicated that only limited tonnages of the huge government stocks of zinc would be sold when trading opened. The announced policy was to release not over 4000 tons per month for the first half of 1953, which would be priced at the monthly average of the London Exchange from February through July. This was designed to keep the market from being flooded with metal at ruinously low levels.

During 1952, U. S. smelters shipped 803,236 tons of slab to domestic buyers, about 33,600 tons less than in 1951, a surprisingly good showing considering the terrific blow the industry suffered from the steel strike. Production of slab was 961,200 tons, up 30,000 tons over 1951. Stocks of slab held at the end of the year by producers were sharply higher than a year earlier and totaled nearly 87,000 tons. This would not be so disconcerting if it were not feared that consumers' inventories also were large. It appears that buyers are still wary of the stability of the price structure and the weakness in the lead price has done nothing to dispel it.

Larger Supplies of Copper Scrap Expected

When Economic Stabilizer DiSalle stated bluntly that copper would not be decontrolled while he was in office because such action would result in an immediate rise in the domestic price he only confirmed the universal belief in the trade. With demand still so strong that the foreign price is maintained without much difficulty at 34.6¢ per lb, there is little doubt that decontrol would cause a boost for domestic copper to about 29-30¢ from the long-established 24½¢ ceiling.

No immediate increase in mine output of copper is seen here or abroad but a substantial increase in supplies of secondary or scrap metal is possible when control is lifted. During 1951-52, the flow of scrap copper to the refineries was abnormally low and it is believed dealers have been holding back such material awaiting higher prices. Normally, about 10,000 tons per month of scrap can be counted on but in 1952 it averaged less than 4000 tons per month. Some copper executives expect about 150,000 tons in 1953 from secondary sources.

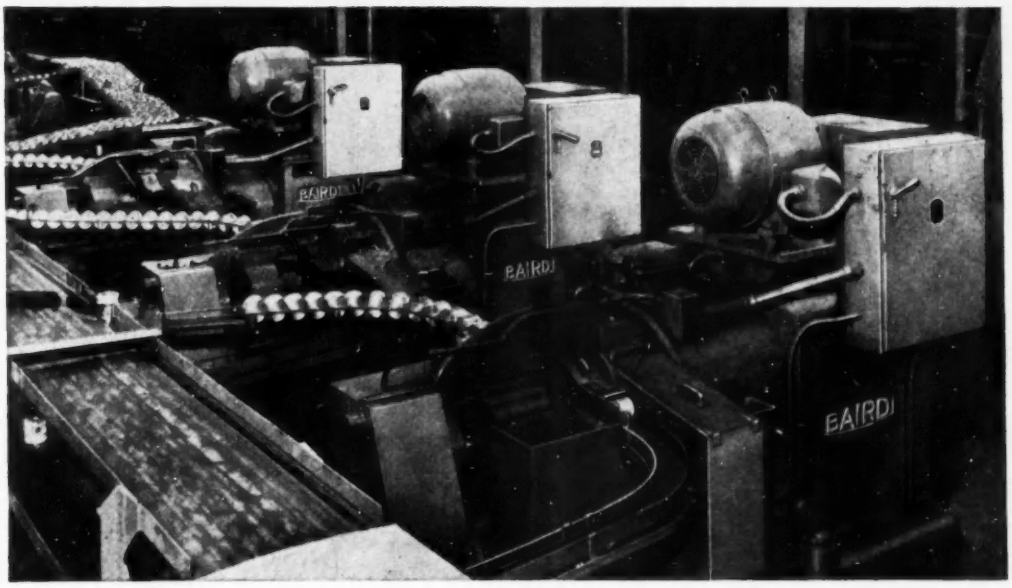
Early in January, the work stoppage was ended at the big Braden copper mine in Chile which had been

ASK

BAIRD

ABOUT IT!

HIGH PRODUCTION TOOLING



BAIRD *Automatic* CHUCKING MACHINES
Join mass production lines at new FORD *plant*

The Baird Machine Company is pleased to share, with other manufacturers of modern automatics, in the high speed production at the Ford Motor Company's new Cleveland Engine Plant.

Shown above is a battery of Baird Chucking Machines. They completely finish-turn the engine piston, and finish the oil ring grooves to size. Machines are automatically loaded from the conveyor and automatically discharge the pistons when they are completed. Operations are fast, continuous, and to close-tolerance machining.

The Baird 76H Chucker (7"-chuck, 6-spindle, horizontal machine) combines, in a single automatic indexing cycle, such operations as turning, facing, drilling, tapping, threading, grooving, and chamfering . . . if desired. Automatic electrical and mechanical safety devices prevent damage when setting up, when loading is not within cycle time, or when any motions are out of sequence.

Other valuable features are: easy access to all tooling, individual tool slides, individual spindle speeds, automatic chucking, maintained accuracy over a long service life.

If you require repetitive production of this nature . . . either hand load and unload, or entirely automatic . . . ask Baird engineers for details.

the **BAIRD MACHINE COMPANY**
STRATFORD • CONNECTICUT

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

strike bound for nearly a month causing a loss of 16,000 tons of production. Increased production is expected from the new sulphide plant at Chuquicamata, Anaconda's subsidiary. Whether both these properties can continue normal operations in case the foreign price of copper declines when controls are lifted in future is a moot question. The attitude of the Chilean government toward American-owned mines is causing no little worry to copper executives. Chile is by far the most important source of vitally needed copper imports for the United States.

NATIONAL BOAT SHOW

(*Continued from page 55*)

Port Washington, N. Y. This cruiser is 20 ft in length and has a hull fabricated of molded-plywood. Its compact cabin sleeps two and houses galley and toilet.

Atlanta Boat Works, Atlanta, Ga., introduced an 18-ft Aristo Craft outboard cruiser which has sleeping accommodations for three persons. This new cruiser has monocoque construction, full longitudinal mahogany stringers and ribbon-striped mahogany plywood. A novel outboard motor mounting bracket which reduces vibration, noise and fire hazard is a feature of the new Aristo Craft.

Another southern builder to enter the field is Barbour Boats, Inc., New Bern, N. C. Its entry was a 19-ft outboard cabin cruiser of lapstrake construction.

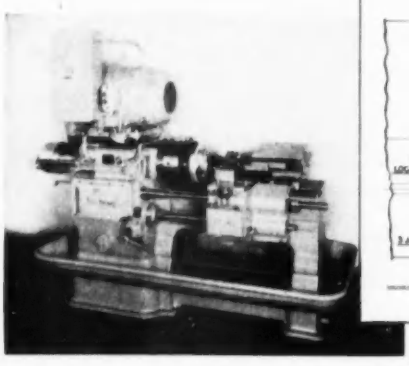
A new exhibitor, Skipper Boats, Greenwich, Conn., too, showed an outboard cruiser. The Skipper is a 21-ft boat with a fully enclosed toilet among its features, which include a hull coated with a new-type of rubber-based paint.

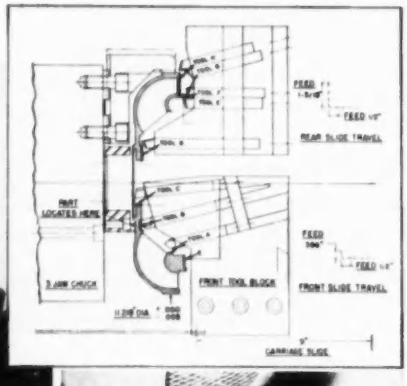
Two 18-ft outboard cruisers were shown. One built by the Topper Boat Co., Baltimore, Md., has a separate water-tight compartment for the outboard motor, planned to prevent a following sea from swamping the motor. The other small cruiser is built by Scottie-Craft, Inc., Miami, Fla. This craft, too, has a novel arrangement for location of the outboard motor well.

Smallest of the outboard cabin cruisers was that built by Du Craft Boats, Warren, Pa. Their exhibit was a 16-ft boat with 6½ ft beam. Known as the Cruisette, the craft has two bunks and 50-in. headroom in the cabin.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *So-swing* PEOPLE" SENECA FALLS, NEW YORK



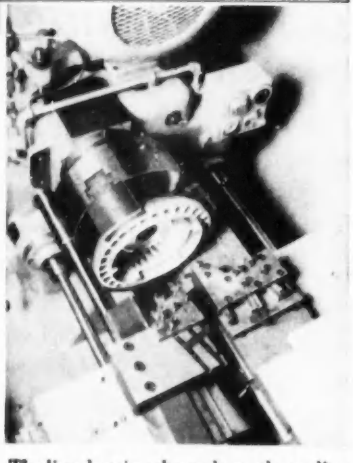


So-swing LATHE MACHINES TORQUE CONVERTER COUPLING AUTOMATICALLY

Problem: To bore, turn and face several dimensions on aluminum torque converter couplings.

Solution: The Model LR Automatic Lo-swing Lathe was selected for this job and special tooling developed to enable all dimensions to be machined in one chucking. The work is held in an air-operated, three-jaw chuck fitted with mushroom type jaws to prevent distortion of the casting.

Carbide cutting tools are mounted on the front and rear slides as illustrated. Both front and rear slides have cross and longitudinal movements permitting either boring or turning operations combined with facing operations. All tools cut simultaneously and the entire sequence of operations is automatic.



The line drawing above shows the tooling layout and identifies the surfaces finished by each individual tool. A production of 60 pieces per hour at 80% efficiency is maintained.

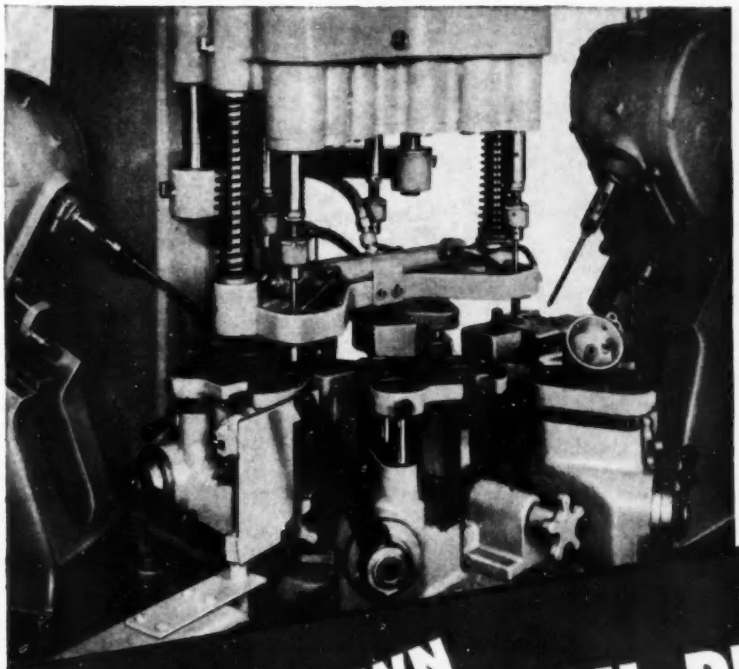
Let Seneca Falls engineers assist in solving your automatic turning problems.

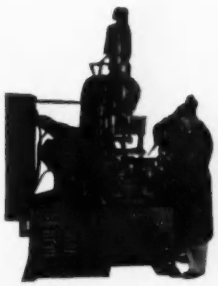
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *So-swing*

BOOKS . . .

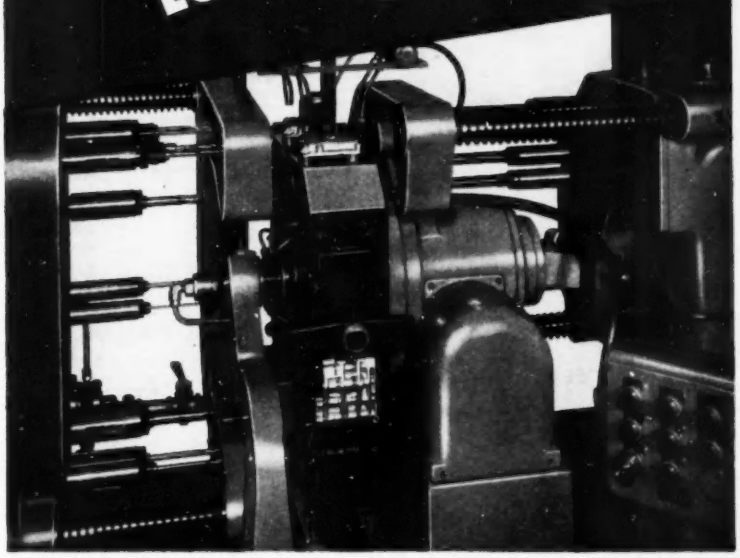
BUSINESS FLUCTUATIONS, *by Robert A. Gordon, published by Harper & Brothers, 49 East 33rd St., New York, N. Y. Price, $5.00.* Included in the scope of this book is a full discussion of the modern theory of income determination, the nature and causes of business fluctuations, and the forecasting and control of such fluctuations. The treatment covers theoretical, historical, and statistical phases of the subject, and represents an unusual blend of theoretical and empirical approaches. A detailed synthesis of the aggregative approach to employment theory, including a study of the causes of fluctuations in the components which lie behind aggregates, is provided. The volume is said to be the first to utilize the business-cycle patterns of the National Bureau of Economic Research in describing what takes place during cycles. Additional notable features are a systematic survey of the present status of business-cycle policy in both the U. S. and foreign countries and a discussion of the international aspects of business fluctuations. The 603-page work is amply illustrated throughout with charts and tables.

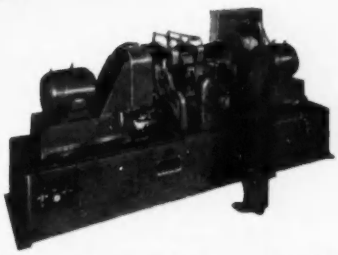




Closeup at the left shows a six station Hartford Automatic single purpose machine rough and finish reaming two cored holes, plus drilling two holes at different angles in die cast aluminum housings.

The LOWDOWN on HIGH PRODUCTION





This view shows a four station Hartford vertical dial type machine drilling, coredrilling and counterboring five holes in aluminum valve bodies.

Hartford Special is ready to design and build a special purpose drilling and tapping machine to boost your production, too. Why not write for more information.

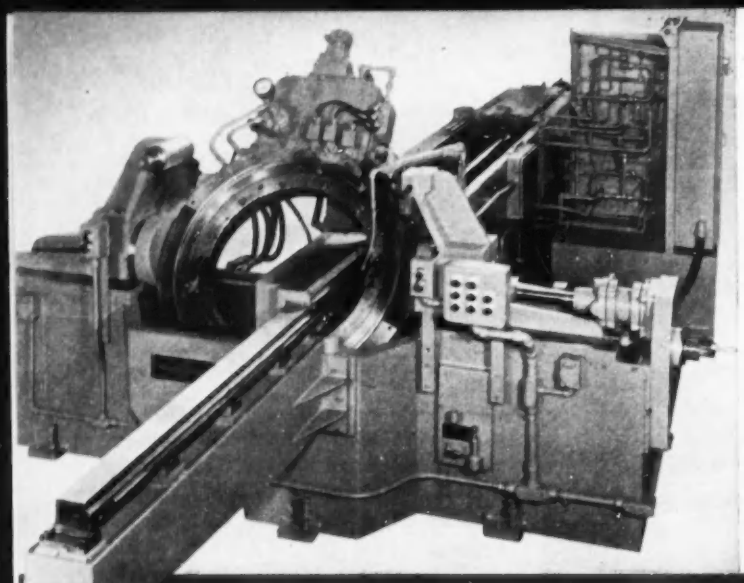
When it comes to production –

SUPER-SPACERS

Automatic THREAD ROLLERS

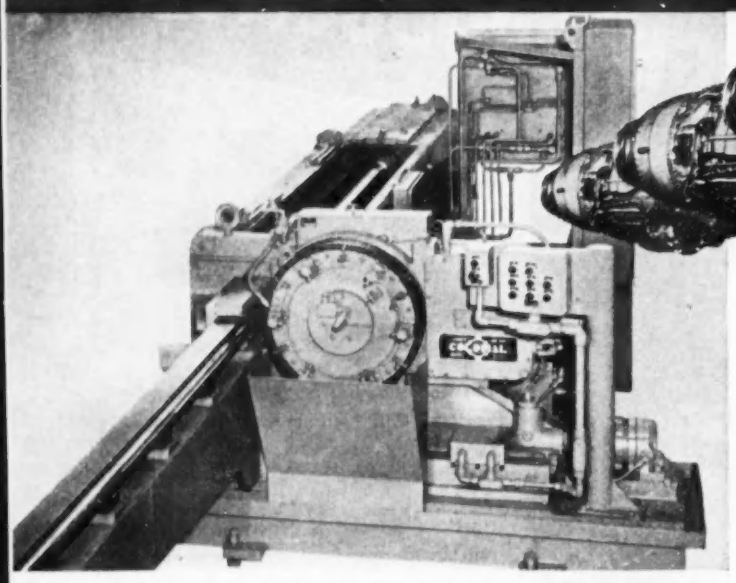
HARTFORD *Special*

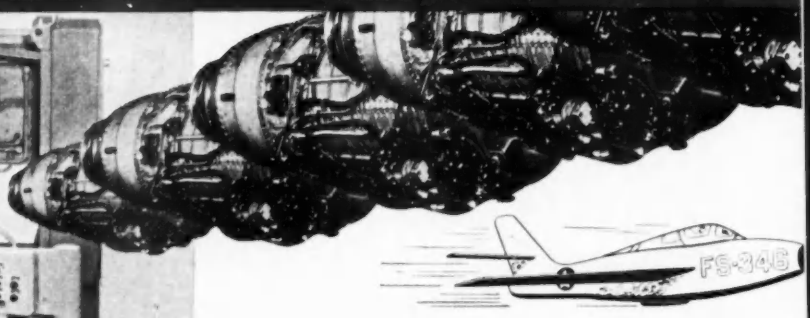
THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.



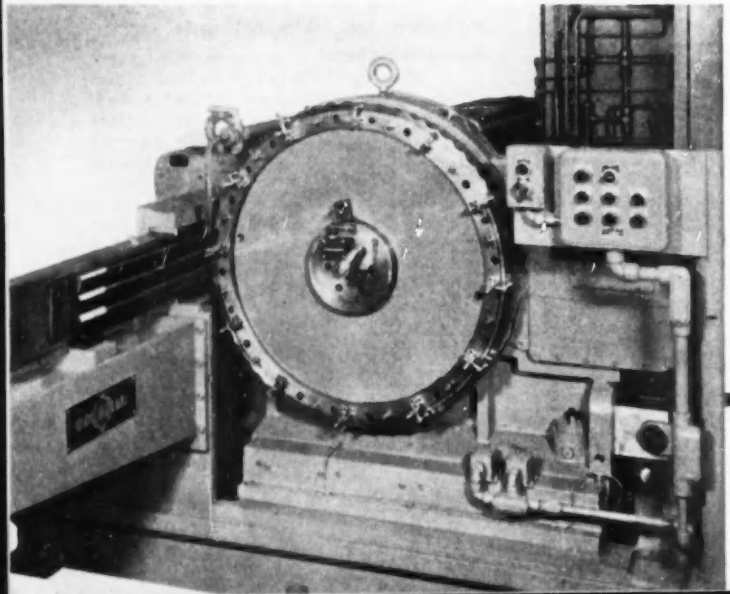
COLONIAL broaching machine, 10-ton 90-inch stroke horizontal, with trunnion fixture for angular adjustment. Shuttling, indexing, ram operation, and rapid return fully automatic, for broaching internal slots on Curtiss-Wright SAPPHIRE ring segments. Pneumatic part ejection manual control.

COLONIALS *in the Shop* MEAN

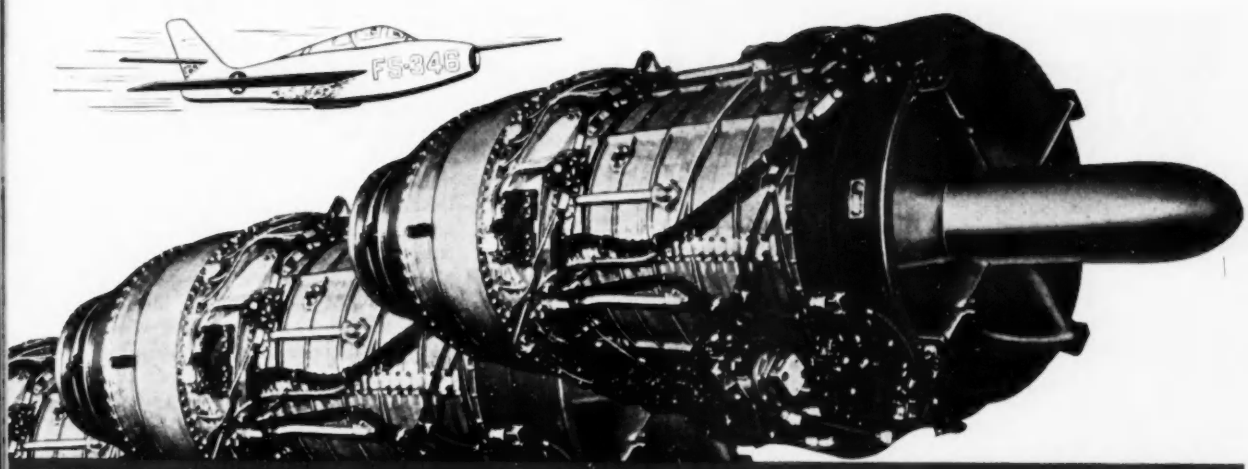




Another fully automatic COLONIAL 10-ton 90-inch stroke horizontal broaching machine broaches external slots on a SAPPHIRE jet engine part. Again, shuttling, indexing and ram operation are automatic, and part ejection is pneumatic manual control.

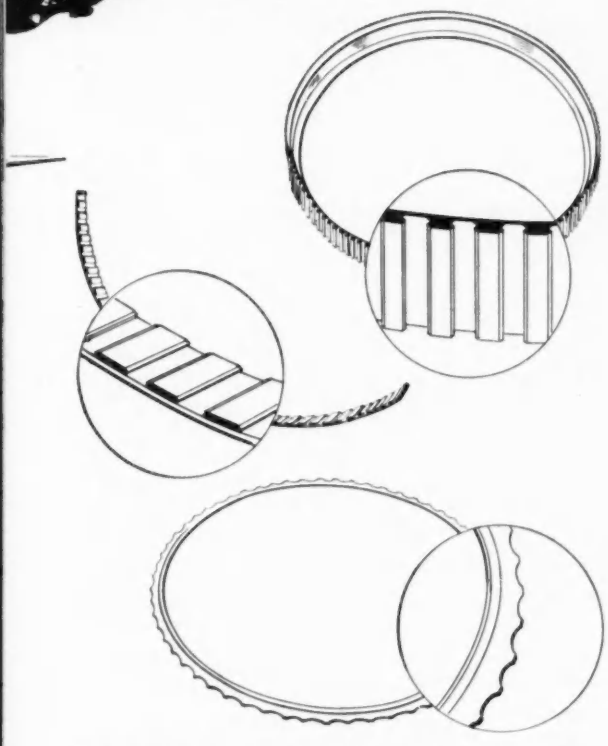


Three external scallops on this Curtiss-Wright SAPPHIRE part are broached automatically with each stroke of the ram, on this 10-ton 60-inch stroke COLONIAL broaching machine. Like the other machines shown, electrical controls permit individual operation of each function for set-up and tryout purposes.



CURTISS-WRIGHT

MORE SAPPHIRES *in the Air*



These drawings, distorted for security reasons, indicate the types of jet engine parts being produced automatically today on COLONIAL broaching machines with 'unified' broaching.

COLONIAL BROACH is proud to be a supplier of broaching machines to the Curtiss-Wright Sapphire jet engine program. This 25% more powerful jet fighter engine has gone into production in record breaking time, and record breaking production will be possible due to the high production accuracy of machine tools like the fleet of automatic Colonial broaching machines, complete with Colonial broaches and fixtures, working on this program.

"Always ready for flight" is the reputation established by SAPPHIRES at the Air Force's principal flight test base. "Always ready for broaching" is the reputation established by COLONIALS in leading production shops of America. This reputation can be traced to Colonial's 'unified' broaching, made possible by designing and producing the broaching machine, the broaches, the fixtures, and the automation, all in Colonial's own plant, and all serviced by Colonial in the production shop.

PIONEERS OF H.S.S. BROACHING

COLONIAL BROACH CO. DETROIT 13

to the man who wants
UNBIASED ADVICE *on* MOLDING MATERIALS

● What molding material is *best*? Which is *cheapest*? That's where American Hard Rubber Company serves so well—and so often. We can select from literally hundreds of hard rubber compounds... many thermoplastics . . . and several unusual materials like Ace-Tex or Ace-Hide shown below . . . plus complete facilities for molding, extruding, machining, finishing, etc. Ask our advice. It's impartial. It's free.

HARD RUBBER — Many Ace compounds offer tensiles to 10,000 psi, excellent chemical resistance, moisture absorption as low as 0.04%, power factor as low as 0.6% . . . molded parts, sheets, rods, tubes, linings, coverings, etc.

HARD RUBBER GUN PLATE

ACE PARLAN® — Tough cellulose acetate-butyrate, high impact up to 9.4 Izod. Good for housings, control wheels, handles, etc.

PARLAN STEERING WHEEL

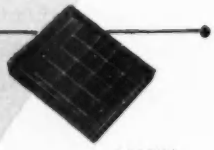
ACE PARIAN® — Polyethylene: tensile to 3,000 psi; dielectric to 700 v/mil, unaffected by most acids, alkalies and salts. Good for chemical, electrical parts.

PARIAN CHEMICAL VALVE

ACE-HIDE® — New rubber-base material is practically indestructible. Impact strength to 10.0 Izod. Chemical resistant. Good for parts that take beating, like acid pails, golf-bag tops, chair arms, etc.

ACE-HIDE CHAIR ARM PAD

ACE-TEX® — Not rubber, not plastic, but a pyrobituminous molding material. Relatively low strength, high chemical resistance. Used in auto battery cases, containers, etc.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American Hard Rubber Company
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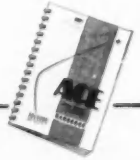
SEND FOR FREE ACE HARD RUBBER AND PLASTICS HANDBOOK



Air Power-Steering

(*Continued from page* 71)

As shown in Fig. 2, further movement of the valve piston (5) opens the inlet valve (7) admitting air under pressure from the reservoir through port (10) and chambers (8) and (9) to ports (11) and (12). A tube connects port (12) with one end of the power cylinder. Air pressure on the valve piston reacts through the bevel gears to the steering wheel, and is proportional to the operating pressure.

The pressure in the power cylinder causes steering movement at the road wheels. This movement rotates bevel wheel (22) and centralizes valve operating pin (3), thus closing inlet valve (7) and releasing the cylinder pressure through ports (12) and (11), the chamber (9) and passages in piston (14) and (15), ports (18) and (17) to atmosphere.

A "kick" at either road wheel produces movement in the steering linkage and as the steering wheel is normally held steady, a valve is caused to operate, admitting pressure to the power cylinder and opposing this movement. Thus most of the "kick" is absorbed by the power cylinder.

Buick Engine Plant

(*Continued from page* 59)

Flamatic, mentioned earlier. One of the interesting tricks developed after start of production was a unique method of finishing the spherical ends. The initial process was a method of radius-grinding the ends. While this assures an accurately ground surface, held to close tolerances, it did not prove fast enough to handle the anticipated volume of engine production.

The latest method is simplicity itself. It consists of wet-tumbling of rods in special barrels, using small granite as the polishing medium. Now in experimental production, wet tumbling promises to produce adequate control of size and finish with extremely high productivity and exceedingly small cost.

The present article will be followed in a succeeding issue with details of selected transfer machine operations on the cylinder block, cylinder head, and intake manifold. It will deal also with materials handling, chip disposal, and engine testing.

To know you're right... replace with

Delco Motors

You can depend on Delco motors to **keep going** in the face of the severest conditions. They are designed, engineered, and built to precision standards to minimize servicing and down-time.

When you need motor replacements—fast—call for Delco. They're available everywhere through local Delco motors distributors.

There's a Delco
for Practically Any
Industrial Application

Open and enclosed motors up to 100 h.p. for standard foot mountings. NEMA C&D flange-mounted motors up to 30 h.p. Explosion proof motors up to 20 h.p.

DELCO DAYTON OHIO

DELCO PRODUCTS

Division of General Motors Corporation, Dayton, Ohio

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SAN FRANCISCO

A GENERAL MOTORS PRODUCT — A UNITED MOTORS LINE

DISTRIBUTED BY WHOLESALERS EVERYWHERE

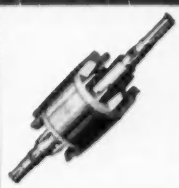
These Features tell you why you're Right with Delco

Water-Tight Conduit Box. Protects against moisture.

Positive Lubrication. Lengthens bearing life.

Delcote Insulation. Permanently flexible, moisture-proof, wear resistant.

Positioned Bearings. Maintain shaft alignment.



Dynamically Balanced Rotor and Shaft Assembly. Reduces vibration.

Corrosive-Resistant Cast Iron Frame. More solid, more rugged.

CALENDAR

OF COMING SHOWS AND MEETINGS

Western Computer Conference, Hotel Statler, Los Angeles, Calif. ..... Feb. 4-6

National Automobile Show, Toronto, Ont., Canada ..... Feb. 13-21

Industrial Ventilation Conference, Mich. State College, E. Lansing, Mich. ..... Feb. 16-19

Society of the Plastics Industry, 8th Annual Conference of Reinforced Plastics Div., Shoreham Hotel, Washington, D. C. ..... Feb. 18-20

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y. ..... Feb. 25-27

Pacific Automotive Show, Civic Auditorium, San Francisco, Calif. ..... Feb. 26-Mar 1

American Society for Testing Materials, Spring Meeting, Detroit, Mich. ..... Mar. 2-6

SAE National Passenger Car, Body, and Materials Meeting, Sheraton-Cadillac, Detroit, Mich. ..... Mar. 3-5

Geneva Automobile & Truck Show, Geneva, Switzerland ..... Mar. 5-15

Chicago Automobile Show, International Amphitheater, Chicago, Ill. ..... Mar. 14-22

National Association of Corrosion Engineers Ninth Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill. ..... Mar. 16-20

21st Annual Meeting, American Society of Tool Engineers, Hotel Statler, Detroit, Mich. ..... Mar. 18-20

German Vehicle Show, Frankfort, Germany ..... Mar. 19-29

National Conference of Instrumentation, Michigan State College, E. Lansing, Mich. ..... Mar. 19-20

27th Automobile Show, Civic Auditorium, San Francisco, Calif. Mar. 21-29

Eighth Western Metal Congress, Pan-Pacific Auditorium, and Western Metal Congress, Statler Hotel, Los Angeles, Calif. Mar. 23-27

SAE National Production Meeting, Hotel Statler, Cleveland, O. Mar. 25-27

International Magnesium Exposition, National Guard Armory, Washington, D. C. ..... Mar. 31-Apr. 2

2nd Annual International Motor Sports Show, Grand Central Palace, New York, N. Y. ... Apr. 4-12

Auto-Lite Easter Automobile Show, Waldorf-Astoria, New York, N. Y. ..... Apr. 6-11

9th Annual Meeting and Show, Metal Powder Association, Hotel Cleveland, Cleveland, O. ..... Apr. 20-22

SAE National Aeronautic Meeting and Aircraft Engineering Display, Hotel Statler, and Aircraft Production Forum, Hotel Gov. Clinton, New York, N. Y. Apr. 20-23

Annual Turin Automobile Show, Turin, Italy ..... Apr. 22-May 3

British Industries Fair, London and Birmingham, England. Apr. 27-May 3

Fifth Materials Handling Exposition, Convention Hall, Philadelphia, Pa. ..... May 18-22

SAE Summer Meeting, The Ambassador and Ritz-Carlton, Atlantic City, N. J. ..... June 7-12

Exposition of Basic Materials for Industry, Grand Central Palace, New York, N. Y. ..... June 15-19

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J. ... June 29-July 3

Eighth National Instrument Conference and Exhibit, Chicago, Ill. ..... Sept. 21-25

Specialized Production of
HARDENED & GROUND PARTS

When you've served the automotive industry for more than 40 years as we have done, you become quite adept at machining difficult pieces like the Beam Ball shown here.

Ball O.D. is ground to 3.375" ±.001; Bore, to 1.375" ±.001. Circular contour is absolutely concentric with bore centerline. Scientifically controlled heat treating provides exceptional surface hardness and consistent strength throughout. The specified finish is Parker-Lubrizing, as used on many of our products.

This is a sample of the metallurgical engineering, precision grinding and uniform quality that can be readily applied to mass production of your turned, hardened and ground parts. Let us quote on your requirements. Write or wire today.

Experienced production on:
King Pins
Shackle Bolts
Shackle Pins
Brake Anchor Bolts
Countershafts
Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
Beam Balls and Bolts
5th Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
... anything in the hardened and ground line, of any analysis steel, up to 4"

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THE BROWN CORP.

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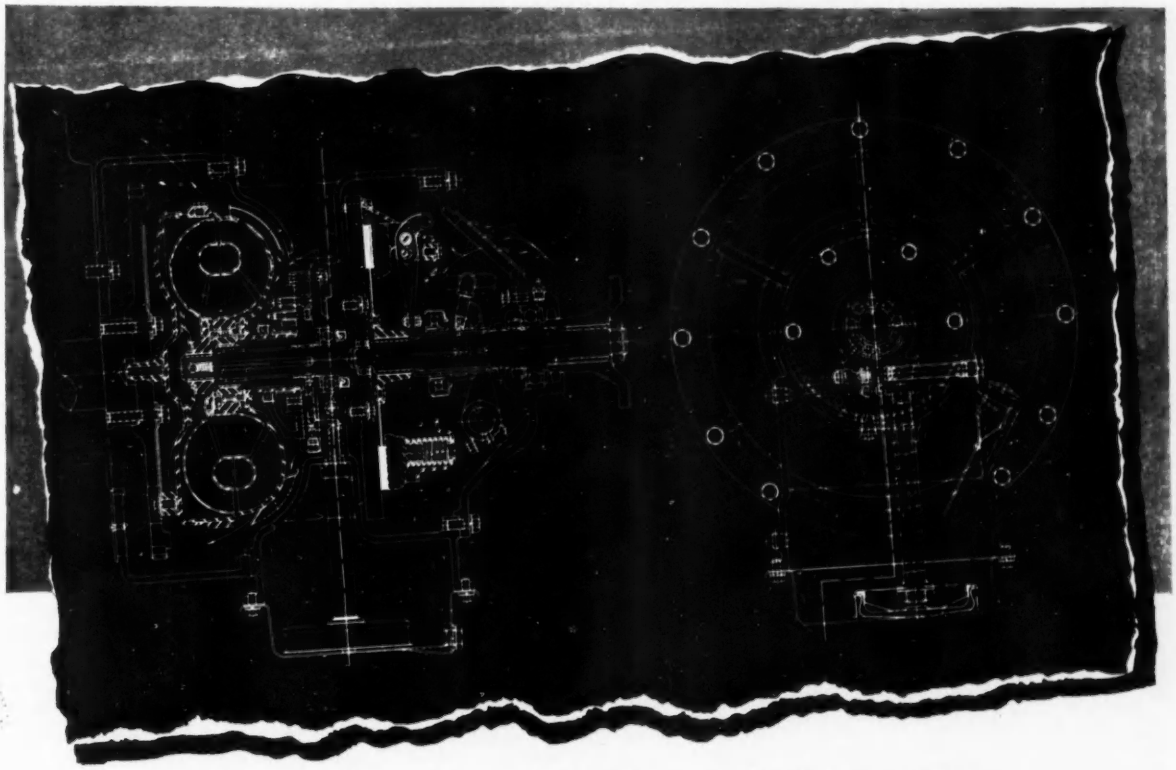
C. H. Ehlert, 2497 Clarendon Rd., Cleveland • R. F. Spring, 4715 Balfour Rd., Detroit • R. C. Sanderson, 2000 N. Clark St., Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • Johns Wilkens & Co., 1440 N. Spring St., Los Angeles, Calif. • John B. Hunt, 8611 S.E. Yamhill St., Portland, Ore.

Douglas Expands

Douglas Aircraft Co. announces a $2 million expansion program at its Long Beach Div. Plans call for a million-dollar engineering test building, a $750,000, electronics building and a $186,000 jet engine test building, with construction to begin in 1953, according to company officials. Continued production of the C-124 Globemaster and production contracts for the RB-66 long range jet, make the expansion necessary. Employment at the Long Beach Div. climbed in 1952 from 12,500 to 18,900 workers.



Installation of an 11-inch converter and 10-inch disconnect clutch. Combined with the customer's oil pump, relief valve, housings and reservoir, it is suitable for many applications. Converter is direct air-cooled, but where service is severe a supplemental oil cooler is easily added. Also available without clutch.

- *high starting torque*
- *smooth, flexible power flow*
- *FOR AUTOMOTIVE • INDUSTRIAL • MILITARY APPLICATIONS*

This Long Torque Converter and Long Clutch combination gives high starting torque, smooth application of power and fluid coupling characteristics at running speeds. Long Torque Converters are available in 11- and 12-inch sizes with ratios of 2.1 to 1 and efficiencies above 90%. Simplified manufacture means lower cost. Simplified design means trouble-free operation.

LONG MANUFACTURING DIVISION, BORG-WARNER CORP.
DETROIT 12 and WINDSOR, ONTARIO

LONG

50 Years of Quality Manufacture for the Automotive Industry

TORQUE CONVERTERS
CLUTCHES
RADIATORS
OIL COOLERS

With full program control to meet all Government Specifications, Tenney TH Chambers are designed to simulate constant or varying climatic conditions for testing electronic components, communications equipment, instruments, and similar units. Relative humidity is automatically maintained from 20% to 95% through a temperature range of + 35°F. to + 180°F. Minimum dew point is 33°F. Controlled variations can be repeated periodically and various periods of repetition can be supplied. Within the approximate range of the operating cycle, any value of humidity and dry-bulb temperature—in either constant or scheduled program—may be attained.

Interiors and exteriors stainless steel; all chambers fully insulated to resist high heat. Conditioning equipment integrally mounted within the chambers with separate panel controls outside. Interior shelving adjustable on 1-inch increments. Other features: interior drain, heavy-duty refrigerator type hardware, vapor-tight door seals, and 2-inch side ports.

SPECIFICATIONS

Model No.	Inside Dimensions (in inches) W D H	Outside Dimensions (in inches) W D H	No. of Doors	Common to all Models
TH-10	22 x 19 x 48	28 x 25 x 74	1	Accurately calibrated thermostatic controllers. Air circulating blowers for uniform air movement. Current: 110-volt, 60 cycle, single phase. Stainless steel interior and exterior.
TH-18	42 x 18 x 48	48 x 25 x 74	2	
TH-27S	36 x 31 x 36	43 x 45 x 66	1	
TH-30	42 x 24 x 48	48 x 31 x 74	2	
TH-37	48 x 24 x 48	54 x 31 x 74	2	

INSTRUMENTATION

Standard: Accurately calibrated indicating thermostatic controllers.

Special: (at extra cost) Cycling, recording, and special instrumentation available for all models. Thermopane viewing window. Terminal Pads. Cams to meet specific cycle requirements.

For further information write:

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ENGINEERING, INCORPORATED

Dept A, 26 Avenue B, Newark 5, N. J. ® 8586

Los Angeles Representatives: GEORGE THORSON & CO. Chicago Representatives: SPARTAN ENGINEERING CO.

Engineers and Manufacturers of Automatic Environmental Test Equipment

SHORTIES

Tiny motors that move the control surfaces of a jet fighter generate twice as much horsepower as was used to propel the Wright Brothers' first airplane.

•

A single aircraft manufacturer today uses more floor space than the entire aircraft industry occupied when World War II broke out in Europe.

•

The Federal Government now owns 24 per cent of all the land in the U. S., a total of 455,146,726 acres, or 711,166 square miles.

•

It is estimated that there are now 9500 executive aircraft operating in the U. S., nearly one-sixth of all civilian aircraft in the country, with 40,000 seats, more than the 35,000 places on all planes of all U. S. scheduled airlines.

•

A recent study of U. S. industry shows that since 1929 taxes on manufacturers have been multiplied 25 times. At the same time, taxes on the wages of the men and women working for these companies have been multiplied 13 times.

•

Seventy-four per cent of all workers in the U. S. reach their jobs by privately owned automobiles.

•

The 8,000,000 U. S. trucks carry 75 per cent of all U. S. tonnage.

•

A recent study reveals that about 85 per cent of the new rubber consumed in the U. S. goes into tires, tubes, and other rubber products used on motor vehicles. Seventy per cent of this figure alone goes into tires and tubes.

•

A national economic survey reveals that since World War II, new car buyers have increased 75 per cent. Where the new car market was limited to about eight million persons before the war, it now has expanded to 14 million.

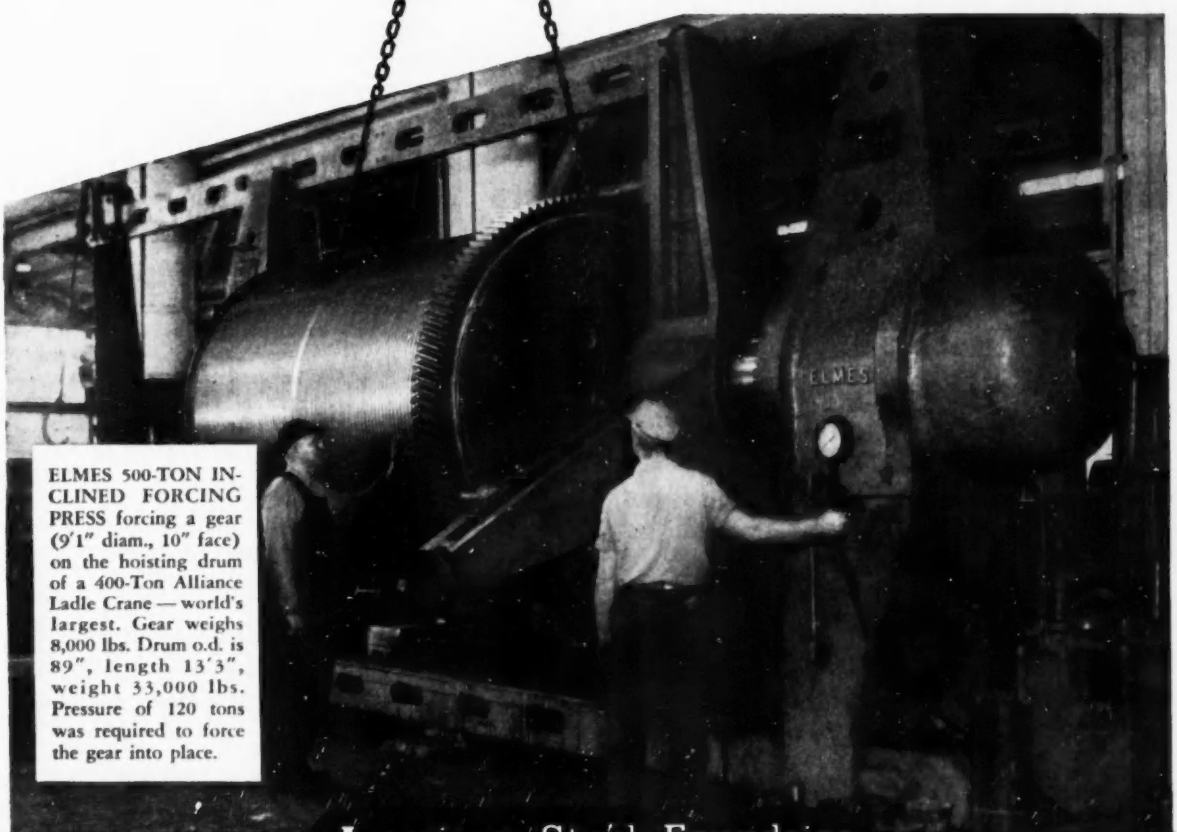
ELMES INCLINED FORCING PRESS
makes this tough job easy . . . and saves 50%!

Forcing the Gear on Hoisting Drum of World's Largest Ladle Crane at The Alliance Machine Company

The Alliance Machine Company, Alliance, Ohio, builder of the world's largest cranes, gives credit to the Elmes Inclined Forcing Press shown below for making possible a *50% saving* on gear installation costs.

By their performance, Elmes Inclined Forcing Presses have earned an outstanding reputation as sturdy tools of production. Built in capacities from 100 to 1000 tons, these rugged, dependable presses are ideal for forcing heavy wheels, gears and pulleys on and off shafts; for inserting and removing bushings; for many other uses in manufacturing and maintenance.

Is your plant doing jobs like these the hard way—the costly way? Why not look into the advantages of an Elmes Forcing Press? They make the tough jobs easy. Your Elmes Distributor can give you details. Write for Elmes Bulletin No. 1055-A. It illustrates and gives major specifications on the complete line of Elmes Hydraulic Forcing Presses . . . Horizontal, Vertical, and Inclined.



ELMES 500-TON INCLINED FORCING PRESS forcing a gear (9'1" diam., 10" face) on the hoisting drum of a 400-Ton Alliance Ladle Crane — world's largest. Gear weighs 8,000 lbs. Drum o.d. is 89", length 13'3", weight 33,000 lbs. Pressure of 120 tons was required to force the gear into place.

American Steel Foundries

ELMES ENGINEERING DIVISION

1113 TENNESSEE AVENUE CINCINNATI 29, OHIO

DISTRIBUTORS IN PRINCIPAL INDUSTRIAL CENTERS — ALSO MANUFACTURED IN CANADA

METAL-WORKING PRESSES • PLASTIC-MOLDING PRESSES • EXTRUSION PRESSES • PUMPS • ACCUMULATORS • VALVES • ACCESSORIES

Plastic Cars at GM MOTORAMA

(*Continued from page 53*)

Mr. Chayne. "These materials are so unlike those previously available that entirely new forming and fabricating procedures are required. In addition," he emphasized, "we must determine what changes, if any, are to be made in body structural design with these new materials. Their stiffness and strength characteristics differ completely from steel."

Skylark for 1953. Buick's production sport coupe, will deliver fully equipped for $5000, f.o.b. Flint, Mich.

Other non-production cars included the latest versions of the Le Sabre and the XP-300, both displaying refinements in detail. Cadillac showed the Orleans, a hardtop-type four-door sedan. A wrap-around windshield of the type seen on the plastic sport cars provided a verticle A-post, and the usual ventilator window was eliminated. No B-post was used; front and rear doors hinge from a central structural member braced by the front seat back. Pontiac displayed a special landau of conventional steel construction.

As to production of cars with plastic bodies, Harlow H. Curtice, GM acting president, said, "It has only been about six or eight months that this material has been available to us, and we are in the process of developing know-how. We may make a few hundred this year. "Chevrolet states that the Corvette is six months to a year away from production.

Present plans are said to call for some 300 Corvettes this year, to sell for about $3000; this figure would represent a net loss to the company of something like $2000 per unit.

Production sports coupes were shown by three divisions. Cadillac displayed the ElDorado, Oldsmobile the Fiesta, and Buick the Skylark. All three are custom versions of the convertible coupe, lower with slight changes in contour, offering more powerful engines and custom appointments.

Working models and cutaways of their products and services were displayed by other GM divisions. These included the research laboratories, the Engineering Staff, the Diesel power group, and Allison, Fisher Body, GMC Truck and Coach, Electro-Motive, Hyatt Bearings, Rochester Products, Detroit Transmission, Delco

(*Turn to page 122, please*)

C.A.V.
The World's largest manufacturers of Fuel Injection Equipment
For Diesel Engines
DEPOTS AND SERVICE AGENTS IN OVER 100 COUNTRIES
C.A.V. Fuel Injection and Electrical Equipment
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Sales Office: 14820 DETROIT AVENUE, CLEVELAND 7, OHIO
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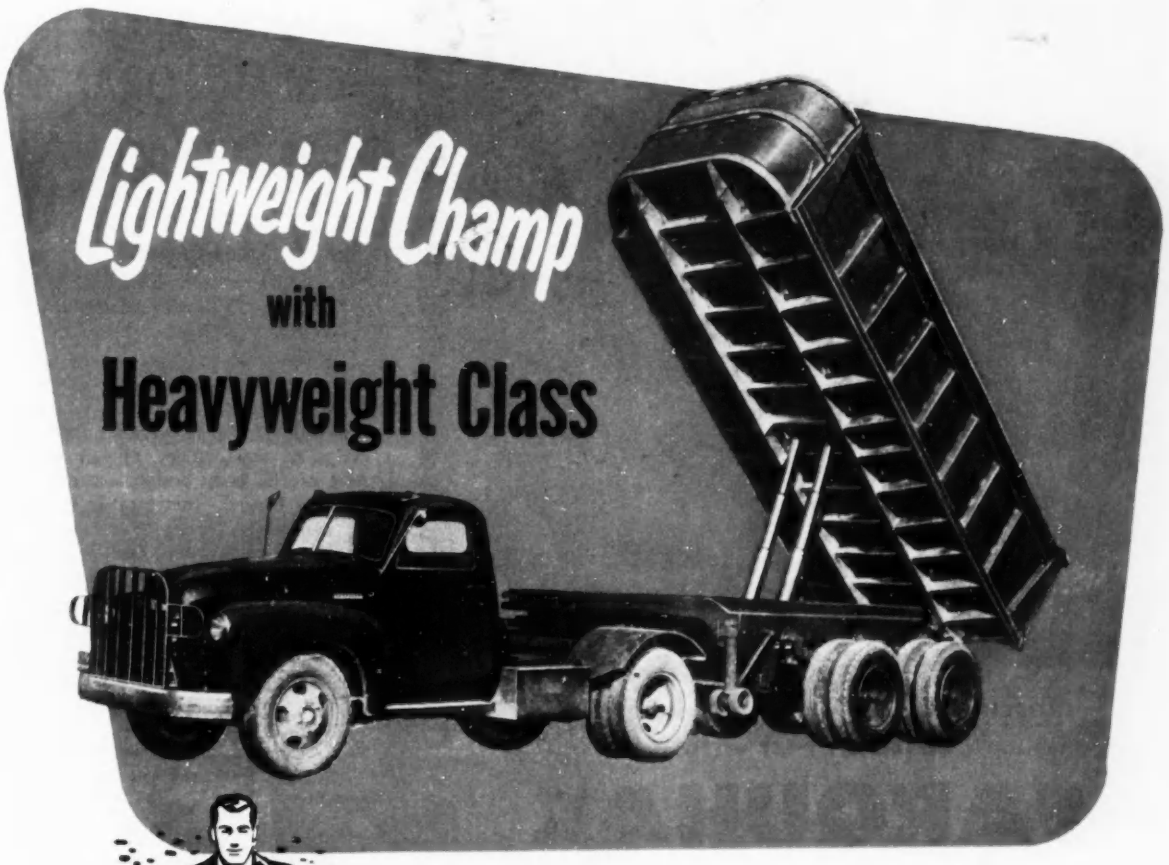
Lightweight Champ with Heavyweight Class



Aluminum delivers a one-two sales punch...

This all-aluminum dump truck body weighs only 2345 pounds. The same "20-ton" body in steel weighed 4800 pounds. Thus aluminum offers a direct weight saving of more than 50% . . . and most important, with gross weight limitations on highways, this saving can be translated into an amazing *2455 pounds of added payload!*

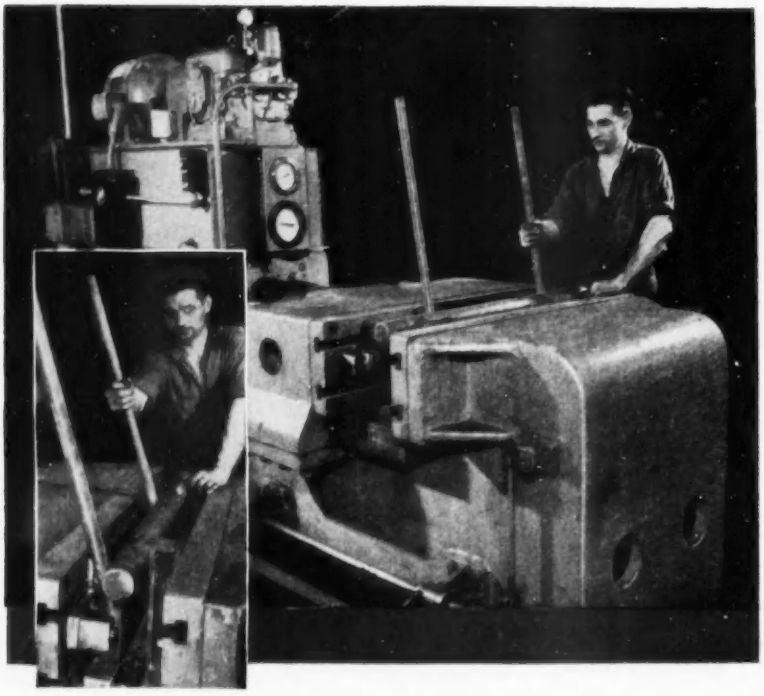
Aluminum helps carry these bigger loads longer and at lower cost, too, because the aluminum bodies will never rust or corrode from exposure to the weather. With rust eliminated, the user of an aluminum body is assured of longer equipment life. He is also assured of lower maintenance costs because aluminum requires no painting or repainting.

Reynolds Aluminum Specialists worked closely with the Marion Metal Products Company of Marion, Ohio, in producing these all-aluminum, all-welded dump bodies for tractor-trailer trucking. If you would like the assistance of Reynolds Aluminum Specialists in adding sales appeal and reducing costs of your products, call the Reynolds office listed under "Aluminum" in your classified telephone directory. Or write direct to Reynolds Metals Company, 2587 South Third Street, Louisville 1, Kentucky.

Be sure to see "Mister Peepers" every Sunday night, 7:30 EST, NBC-TV; hear "Fibber McGee and Molly" every Tuesday night, 9:30 EST & PST, NBC.

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND



Mercury Mfg. Co. does a better job twice as fast with a

FARQUHAR Hydraulic Press

Mercury Manufacturing Co., Chicago, Ill., producers of fork trucks, tractors and trailers, uses a 200-Ton Farquhar Horizontal Bulldozer press to make forgings and stampings and to form plates. In operation 8 hours a day, the press does most jobs twice as fast as the mechanical bulldozer used formerly, and better speed control produces better work.

In addition, many pieces of work that used to be farmed out are now done at Mercury—providing better production and quality control, and effecting additional savings of time.

In the operation shown above, high carbon brazed steel is bent quickly and accurately. In other operations, the press forms heads on bolts, legs for caster forms, and bends structural T frames.

Mercury reports very small maintenance costs, and sums up the company's satisfaction with, "It's the best!"

Farquhar Presses Cut Your Costs

Just one more example of cost-cutting Farquhar performance in heavy production! Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost!

Farquhar engineers are ready to help solve whatever production problem you may have. Give them a call.

Send for Free Catalog showing Farquhar Hydraulic Presses in all sizes and capacities for all types of industry. Write to: A. B. FARQUHAR CO., *Hydraulic Press Dept.*, 1523 Duke St., York, Pa.

—A. B. FARQUHAR COMPANY Division of THE OLIVER CORPORATION—

Plastic Cars at GM MOTORAMA

(*Continued from page* 120)

Radio, Saginaw Steering Gear and Frigidaire Divs.

Custom Features

Styling and mechanical innovations introduced on the various special cars cover a wide field.

On the Le Mans Cadillac sport car, part of the reduced length of 196 in. is accounted for by special bumpers which in the rear are vertical strips of steel. They appear to be part of the body design but are internally braced. Instruments include a tachometer. The radio is controlled by single pushbutton tuning. Twin speakers are recessed behind the panel.

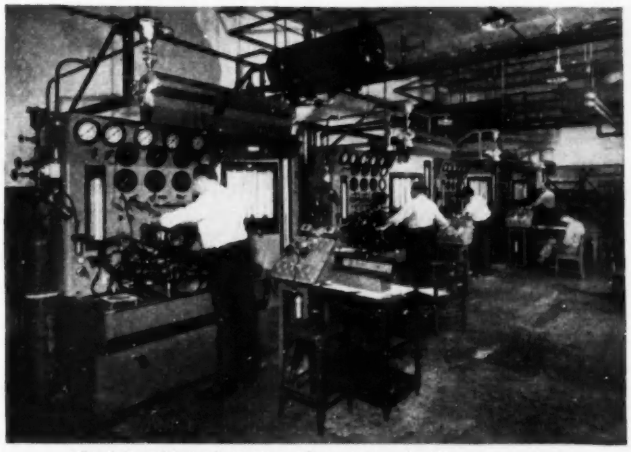
The Hydra-Matic indicator has been customized into the instrument panel between the tachometer and speedometer. The entire instrument panel is topped with a crash pad insulated with a special, slow-recovery plastic which eliminates the rebound found in rubber.

A special feature of the Le Mans is the "memory" seat. Electrically controlled, it automatically slides back as the door is opened. When the door is closed, it "remembers" its former position and returns to it. The seat is also adjustable to the driver. The bolster at the forward edge of the seat contains a tube for umbrella storage.

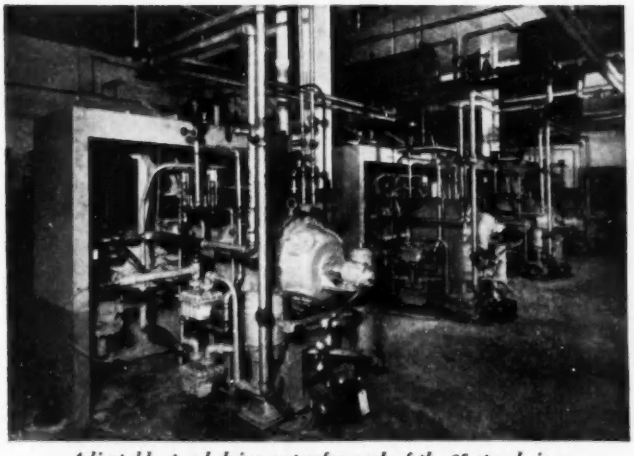
The Cadillac Orleans sedan is equipped with a standard household electrical outlet. A converter, which changes the generator's direct current into alternating current permits the operation of radios and other electrical appliances requiring up to 40 watts. A compartment in the backrest encloses a standard electric razor and there is also a vanity case. As a safety feature, electric locks are automatically controlled by the Hydra-Matic shift lever. With this mechanism the rear doors can only be opened when the gears are in neutral.

Entering the Pontiac Parisienne landau by the right door, the right front compartment seat automatically moves forward 11 in. This innovation, hydraulically operated, is likely to be carried over into the future stock models. A plexiglas dome may be fitted over the driving compartment in bad weather.

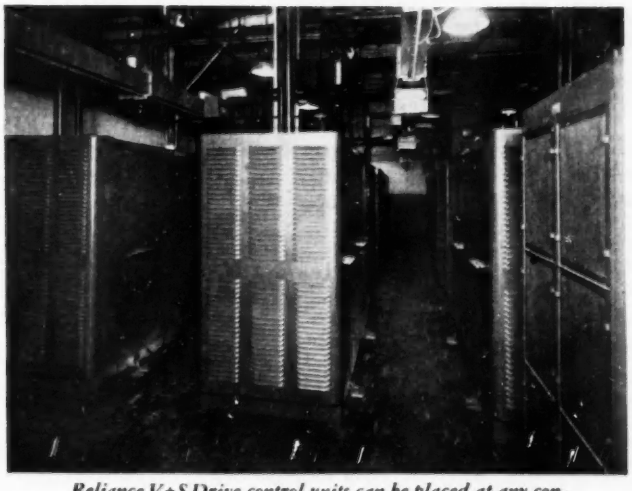
Special exterior color combinations



Obtaining flight data from the test stands. Note convenient Reliance V★S Drive controls to the right of each operator.



Adjustable-speed drive motor for each of the 25 stands is a 75-horsepower explosion-proof Reliance Heavy Duty Type 'T'.



Reliance V★S Drive control units can be placed at any convenient location. Here they have been put in a separate room.

25 JET TEST STANDS

powered by RELIANCE V★S DRIVES simulate engine flight conditions at 50,000 feet . . . .

Using 25 specially designed test stands, the Holley Carburetor Company tests fuel-flow governors under conditions similar to those they will encounter in jet engines splitting the air from sea level to 50,000 feet up. Through grueling test periods, generally in excess of 24 hours, these test stands ask a lot of their drives.

The Reliance V★S Adjustable-speed Drive . . .

1. Supplies the needed driving power despite tremendous loads caused by simulating ram and flight conditions.
2. Guarantees speed regulation of one-half of 1%—or better—within half a second.
3. Provides convenient, easy-to-operate controls.

A Reliance Electronic Regulator coordinated with each drive provides the precise speed regulation required for the success of the test. As the governor takes over regulation of the speed, the electronic regulator performs the vital function of preventing any over-run of speed as the load decreases.

The outstanding job being done on these test stands offers one more example of the versatility and flexibility of Reliance V★S Drive. For more detailed information about Reliance V★S, the original packaged all-electric adjustable-speed drive for a-c. circuits, write for Bulletin D-2311. D-1410

Sales Representatives in Principal Cities

RELIANCE V★S DRIVE

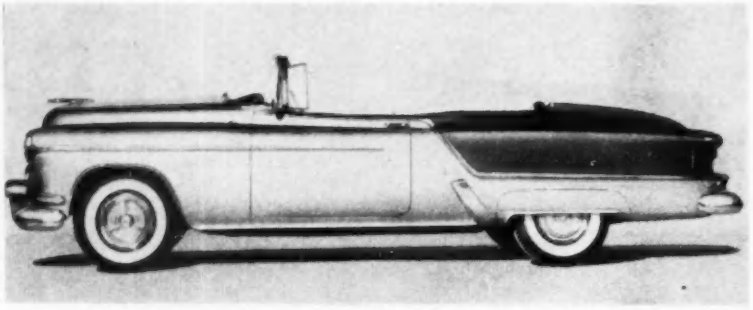
RELIANCE ELECTRIC AND ENGINEERING CO.

1061 IVANHOE ROAD, CLEVELAND 10, OHIO

Plastic Cars at GM MOTORAMA

(*Continued from page* 122)

and interior trim designs were shown on most of the 38 cars on display. Several unique two-tone combinations are announced as available on the production sport coupes when deliveries begin. Bright metallic leather finishes which give a sheen to the upholstery, and metallic-thread woven upholstery drew considerable comment.



The Olds Fiesta coupe is in production, lists for $5715. Compression ratio of Rocket engine is 8.3 to 1, for 170 hp. Power steering, brakes are standard, as is custom leather upholstery.

Try-it-yourself exhibits drew particular attention. In the Rochester Products Div. display of a transparent cutaway of a V-8 engine, the parts moved at idling speed. An oversize transparent cutaway model of the Rochester four-jet carburetor showed fuel flow and check valve movements by means of lights and motors. Dials registered hp and mph. When the visitor depressed an accelerator pedal, the engine speeded up, the dials registered, simulated fuel flowed through the jets as the power valve opened, and the throttle valves opened and closed in sequence.

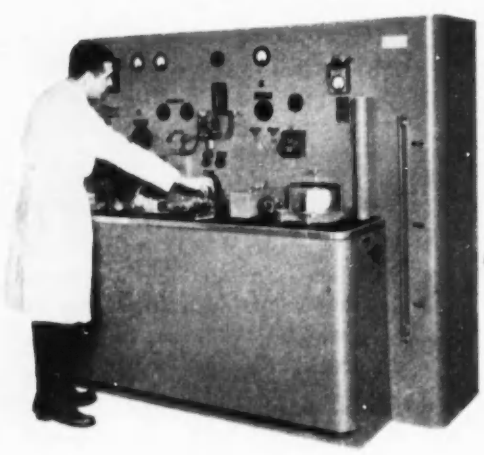
A Research Div. single-cyl test engine allowed the visitor to control compression ratio, air-fuel ratio and octane to eliminate knock. An Allison J-35 turbojet animated display proved interesting.

Timetable for the projected tour of the Motorama calls for showings in six cities from coast to coast. The schedule is: Miami, Fla., Feb. 12-17; Chicago, Int'nl Amphitheater, Mar. 14-22; Los Angeles, Shrine Convention Hall, April 11-19; San Francisco, Civic Auditorium, May 1-7; Dallas, Fair Grounds, May 16-24; Kansas City, Civic Auditorium, June 6-14.

CEC Acquires Part Of Kodak DPI

Formal acquisition of the vacuum equipment department of Eastman Kodak's Distillation Products Industries by Consolidated Engineering Corp. has been announced. The new company will operate under the name of Consolidated Vacuum Corp. as a subsidiary of CEC.

Consolidated Vacuum Corp. will continue to manufacture DPI high vacuum equipment and complete high vacuum systems, as well as the complementary line of valves, gages, pumps and pump oil.



19 PARTS TESTED ON 1 UNIT

Problem: Design and build test bench to check operation of 19 different electrical mechanical and hydraulic accessories.

Solution: The compact, multi-purpose Nankervis Accessory Test Stand illustrated.

This problem was presented to the Nankervis Company by a prominent manufacturer of military vehicles. Functional operation of the accessories . . . **battery—generator indicator—fuel tank sending unit—bilge pump assembly—lighting control switch—to mention only a few . . .** required many complex electrical and hydraulic circuits besides unique mechanical devices.

The solution to this problem was worked out by Nankervis—resulting in the compact, self-contained test bench illustrated. All 19 accessories are tested on one bench.

When you think of special testing equipment—Why don't you, too, call in a Nankervis representative? He'll show you a better way to do it . . . and at less cost. For more information—Write today.

Nankervis designs and builds all types of special equipment for testing complete engines, hydraulic components, electrical accessories and similar electro-mechanical devices.

GEORGE L. NANKERVIS COMPANY

INDUSTRIAL TESTING DEVICES

19255 W. Davison Avenue Detroit 23, Michigan

WE FORESEE YOUR DIEMAKING NEEDS ...and meet them!

More than 30 years' *past* experience in supplying diemakers' needs has taught Danly how to foresee *future* needs. In almost every instance, there are *standard* Danly Die Sets and *standard* Danly Diemakers' Supplies to meet your diemaking specifications.

You can rely on Danly's reputation for precision and dependability when you start your tooling program. You can be sure of prompt delivery from completely stocked Danly branch assembly plants located in nearly every major toolmaking center.

So save tooling time . . . get into production faster . . . insure longer production runs . . . with Danly Die Sets and Danly Diemakers' Supplies.

FAST, COMPLETE SERVICE!

DANLY

DANLY MACHINE SPECIALTIES, INC.
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A NATIONWIDE BRANCH PLANT SYSTEM

***CHICAGO** 50	2100 South Laramie Avenue
***CLEVELAND** 14	1550 East 33rd Street
***DAYTON** 7	3196 Delphos Avenue
***DETROIT** 16	1549 Temple Avenue
***GRAND RAPIDS**	113 Michigan Street N.W.
INDIANAPOLIS 4	5 West 10th Street
***LONG ISLAND CITY** 1	47-28 37th Street
***LOS ANGELES** 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 East Wisconsin Avenue
***PHILADELPHIA** 40	511 W. Courtland Street
***ROCHESTER** 6	33 Rutter Street

**Indicates complete stock*

MARKEM SOLVED THIS MARKING PROBLEM

PRINTING LABEL INFORMATION ON CARTRIDGE ENCLOSED FUSES

Working closely with Underwriters' Laboratories, Inc. and with leading fuse manufacturers, Markem has developed a method which makes possible for the first time the printing of label information directly on cartridge enclosed fuses at production rates. Markem's direct ink imprints cannot "fall off" and are unaffected by moisture or ordinary chemical atmospheres. Paper label inventory and wastage problems are eliminated. Print is larger and color coding and identification are simplified. Fuse manufacturers anticipate better labeling at higher production rates and with lower costs. The Markem Method —Markem Machine, Markem type and ink and the special recording die roll for use when UL Manifest is required—as well as the imprint itself meet with UL approval.

MARKEM® MARKS THEM ALL

CAN MARKEM HELP YOU? Printing labels directly on cartridge enclosed fuses is but an example of how Markem solves industry's marking problems. Markem has been providing industry with production techniques and equipment to identify, decorate or designate its products, parts and packages since 1911. Markem also provides technically trained men who are available in your area to assure *continued* satisfaction with Markem methods and equipment.

When *you* have a marking problem, tell us about it and send a sample of the item to be marked. Perhaps a complete Markem method has *already* been developed to solve your problem. If not, Markem will work out a practical solution.

Markem Machine Company, Keene 8, N. H., U.S.A.

MARKEM ...TO MAKE YOUR MARK

News of the MACHINERY INDUSTRIES

(*Continued from page 73*)

open capacity which they are seeking to fill with new business. An encouraging factor is the possibility that the Government may go ahead with its plan to buy and stockpile machine tools for use in a future emergency. If the program materializes, it would result in about $1 billion worth of new orders for the machine tool industry. Figures for November show that new orders dropped sharply from the previous month to an index figure of 210.1, a sharp decline from 243.3 in October and 302.4 in September, 1952.

Replacement Machine Market Forecast For Importers

It has been forecast by Eric R. Bachmann, a member of the American Association of Machinery Importers, Inc., that the major share of sales for imported machine tools in 1953 will come from orders for replacement machines. He stated that the comparative lull at the present time is expected to be the prelude to the stimulation of new purchases.

Now that the advantage of quick delivery has disappeared, the AAMI member still feels that there is a definite place in American economy for European machine tools.

Diesel Versus Gasoline Fork Lift Trucks

Speaking before a recent meeting of the SAE, L. C. Daniels, vice president, Buda Co., Harvey, Ill., gave some cost figures on gasoline and Diesel fork lift trucks. According to Mr. Daniels, a comparison was run with fork lift trucks equipped with a 230 cu in. Diesel and a 226 cu in. gasoline engine. The following table is from his paper:

	Gasoline	Diesel
Average gallons of fuel per hour	1.2	.62
Fuel cost per gallon	$0.234	$0.129
Fuel cost per hour	0.2808	0.07998
Savings in Diesel over gasoline per hour		$0.20082

This savings, based on an eight hr day, five days a week, 4½ weeks per month would result in the following according to Mr. Daniels:

Savings per 40 hr week	$8.0329
Savings per month	34.782
Savings per year	417.56

He went on to say that the additional cost of Diesel powered fork lift trucks of the 6000 lb and 7500 lb capacities would not exceed $1000 over the cost of the equivalent gasoline powered truck, and that this ad-

Write for this | *NEW and Comprehensive*

72-page PRESS BRAKE catalog

- Applications of Press Brakes
- The Cincinnati Line of Accurate Press Brakes
- Cincinnati Standard Features
- Important Fundamentals in selecting a Press Brake
- Specifications and Dimensions of Cincinnati Press Brakes
- Filler Blocks or Die Holders
- Special Features
- Punching Equipment and Dies

The latest features and developments in the extensive line of Cincinnati Press Brakes are thoroughly covered in this new catalog.

Many varied operations in industry are illustrated. They may suggest applications that bring new economies and increase production in your plant, as they have in many plants throughout the country.

On your request, we will promptly mail to you, the new Press Brake Catalog B-4 B

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

ditional cost would be offset in approximately 27 months just from Diesel fuel savings.

Mexican Machinery Imports

Mexico broke all previous machinery import records during 1952, according to Alberto Carranza, of the Mexican Association of Machinery Importers. Industrial machinery, including precision type equipment for the production of fine steels, machine tools, etc., increased from $11,571,143 in 1950 to $23,148,000 in 1952. However, the Association believes that as Mexican machinery plants enter a new age of production, with new factories yet to be built, the nation's machinery needs will be fully met, with imports dropping to low levels or disappearing entirely.

Ceiling Price Adjustments

Manufacturers of machinery and related products may put into effect, on or before Feb. 6, newly-announced methods of computing ceiling price adjustments to cover higher costs of conversion steel.

One important feature of Amendment 42 to Ceiling Price Reg. 30, issued Jan. 7, is the authorization for manufacturers to use either actual or estimated payments for conversion steel, including costs of transporting and converting it, in determining whether they are entitled to adjustments. Previously, they could employ only actual costs.

Amendment 42 also permits a machinery producer to recompute an existing conversion-steel adjustment each month, or bi-monthly, or quarterly. Earlier, only quarterly recomputations were authorized.

New alternative methods described in Amend. 42 allows computations on:

1. Individual product basis, wherein the amount of higher payments for conversion steel during the computation period is divided by total net sales within that period.

2. Steel content basis, in which the amount of higher payments is divided by total amount of steel used during the period.

3. Product line basis, in which the steel content adjustment may be applied to an entire product line, instead of to an individual product.

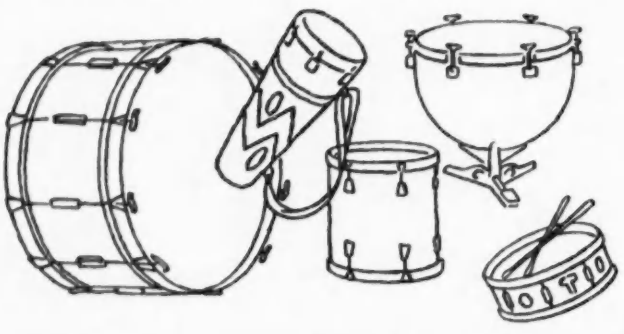
Federal price setters expect manufacturers to find these alternative procedures will furnish considerable flexibility in making adjustments.

Earnings, Taxes, Up

Shipments of over $38.5 million, or an increase of better than $5 million over the previous high set a year ago, were reported by Reliance Electric & Engineering Co., Cleveland, Ohio, for the fiscal year ended October 31, 1952. President J. W. Corey stated that the company's net worth also reached a new high, increasing by $1.4 million to $11.5 million. Federal taxes for the year increased from $3.98 million to approximately $4.82 million. Net earnings for the year, after taxes, were $1,816,140 as compared to the 1951 figure of $1,727,215 on net sales of $33.3 million. Mr. Corey claims that the firm has a backlog of $17 million.

Binks Enlarges Painting School

Binks Manufacturing Co. recently announced that its spray painting school has been enlarged to accommodate a far greater number of students. Classes are conducted at the Binks Chicago plant to train officials, foremen, supervisors, distributors or jobber representatives and those who service spray painting equipment.



All drums look alike!

We've a point to make — one drum of chemicals looks like the next and there is no practical way for you to prejudge the ability of a drum of chemical to do the job you require. For the most part, chemicals are bought on confidence — on the recommendations of responsible chemical suppliers and their engineers.

For 10 years Klem Chemicals, Inc. has served important large and small manufacturers of production parts and products. Klem has analyzed countless unusual conditions and successfully produced compounds that have enabled industrialists to eliminate bottlenecks and establish profitable production schedules. Klem has also developed many standard formulae for meeting tough, but not uncommon conditions.

Klem's business has grown on the strength of confidence in their ability to solve problems.

3 OF 20 STANDARD KLEM PRODUCTS

KLEM KOTE No. 240 — A new and superior phosphate coating for metal surfaces, assuring better paint adhesion.

BOOTH KOTE No. 69 — Coating for dry spray booths—non-inflammable, non-flaking. Provides easy peeling off of accumulated paint.

RUST SOL No. 113 — An easy wipe-off process for cleansing and preparing steel for painting. Dissolves oil, soil, rust, etc. Neutralizes surface.

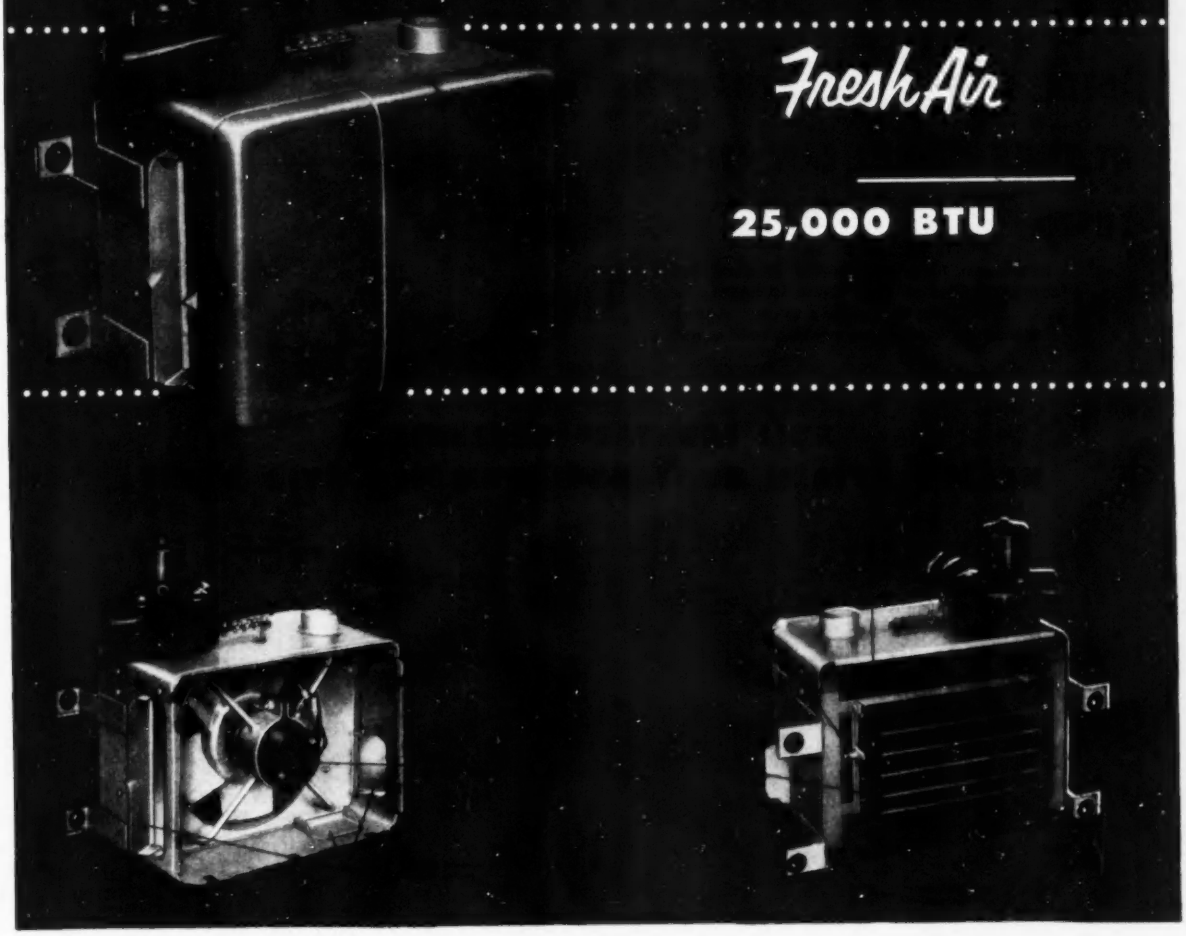
KLEM PRODUCT of the MONTH

STRIP-AID No. 176

Save 50%, add low percentage to your stripper — get fast one-step action. Save materials, labor, heat — salvage rejects, strip accumulated paint from hangers, dollies, at low cost. Write for details.

KLEM Chemicals Inc.
14401 LANSON . . . DEARBORN, MICHIGAN

NEED POWERHOUSE HEAT OUTPUT?



EVANS ENGINEERING IS AVAILABLE TO HELP SOLVE YOUR PROBLEM

Evans automotive heating and ventilating equipment is engineered in detail for each individual installation. Experience proves that only with such custom construction can a truly satisfactory heating and ventilating system be devised for the wide variety of commercial cars, trucks and buses now on the road or on the drawing board.

The Evans organization is staffed to engineer promptly an installation to your specifications, organized to build prototypes quickly, equipped to conduct precision tests to latest A. S. H. V. E. procedures. Military experience dating back to World War I qualifies Evans to work well with you in meeting the rigid specifications of the Armed Forces. If your needs are for high performance, ruggedly constructed automotive heating and ventilating equipment—custom built to your specifications—it will pay you to consult *Evans Products Company, Heating & Ventilating Division, Dept. P-2, Plymouth, Michigan.*

BALANCED HEATING & VENTILATING
CUSTOM HEATERS
FOR EVERY TRUCK AND BUS

EVANS

ACE PLASTIC EXTRUSION

PLUS FABRICATION

- from Rods
- Sheets, Tubes
- Special Shapes

Extruded parts from the raw material to the finished product . . . an Ace specialty. Ace Plastic rods, tubes and shapes are custom extruded and machined automatically to your most exacting specifications. Let our engineers assist you with your plans.

WRITE TODAY FOR SAMPLES; send prints for quotations

By the manufacturers of famous Ace Nylon Balls

ACE PLASTIC COMPANY

Precision Plastic Fabricators and Extruders

91-46 Van Wyck Expressway • Jamaica 2, N. Y.

TELEFLEX

MECHANICAL REMOTE CONTROLS

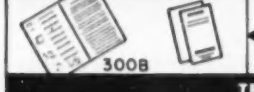
UNLIMITED ROTARY MOTION—The meshing of the screw-type flexible Cable and the specially hobbed gear of the Teleflex Control Box allows unlimited rotary motion.

EFFICIENCY—The unique construction of Teleflex Cable permits Teleflex Controls to operate efficiently in both tension and compression.

MINIMUM LOST MOTION—The close tolerance held between Teleflex Conduit and Cable reduces snaking of the Cable within the Conduit.

FLEXIBILITY—Conduit and Cable can be routed around obstructions and through areas where space is limited.

EASE OF INSTALLATION—Teleflex controls are assembled at point of installation from standard Teleflex parts. Pre-fabricated controls also are available.



For further information write for Catalog 300B. Engineering data for calculating operating loads and backlash is available also.

TELEFLEX INCORPORATED

125 S. Main Street
North Wales, Pa.

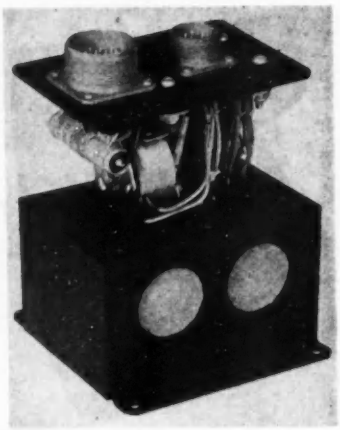
New Products

For additional information please use postage-free reply card on page 81

(*Continued from page* 80)

Circuit Selector

Recently announced is a Ledex circuit selector that is said to meet the explosion proof requirements of MIL-E-5272, Procedure 2.



The unit is installed in a container with conventional plug type connectors for the circuits. The container is made of heavy-gage aluminum with sintered bronze ports.

A choice of selectors for various applications is available. All of them are powered by a rotary solenoid. Switch assemblies are designed to the order for use on military equipment. *G. H. Leland, Inc.*

Circle P-9 on page 81 for more data

Spark Plug Tester

An improved spark plug firing indicator provides a fast check of spark plug voltage and ignition ailments.

Improvements include a needle probe for testing spark plugs having terminals equipped with protective rubber boots and a new method of mounting the special high intensity neon tube to decrease shock damage.

The needle probe is supplied with a metal sheath which serves as a test terminal at all times, except when perforation of a rubber boot or cable insulation is necessary. *Champion Spark Plug Co.*

Circle P-10 on page 81 for more data

Chance Vought F7U Cutlass

Here's a simple equation:

NO HIGH ALLOY STEEL = NO PLANE

Without stainless steel, super-high-temperature steels and special electrical alloys, it just wouldn't be possible to build, power and control a plane in the over-600-miles-per-hour class. That is our job: to develop and produce such metals . . . and if you have any problems that involve resisting corrosion, heat, wear and great stress, or require special magnetic properties, we're the people to see. *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.*

PIONEERING on the Horizons of Steel

Allegheny Ludlum

AL
LEADING PRODUCER
HIGH-ALLOY STEELS

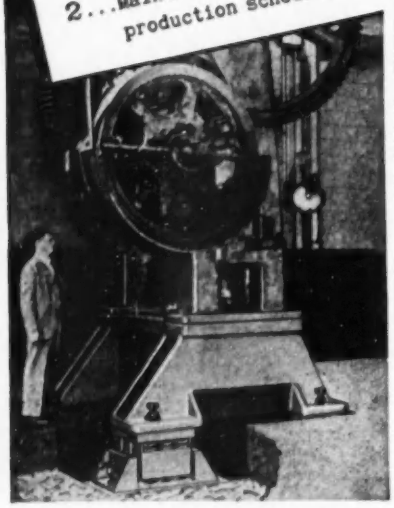
WSD 4102 B

Here's How

Hawthorne Metal Products Company

1...Stopped serious damage to building walls

2...Maintained heavy production schedules



Huge 600 ton capacity press weighing 100,000# at Hawthorne Metal Products Company, Royal Oak, Michigan. Special 25,000# capacity Korfund Steel Spring Vibro-Isolators installed directly under the press weigh 600# each.

..by controlling shock

Shock from this big press was cracking building walls. To maintain heavy production schedules, this condition had to be remedied — fast.

Korfund's Detroit representative was called in, analyzed the problem, and 'phoned in the important data to the Korfund factory. Korfund engineers immediately started designing and building the special Isolators.

Seven days later, they were shipped!

This press has now been in daily operation for over a year, and shock transmission to the building has been completely eliminated. Yet the 100% effective Korfund Isolators cost less than 3% of the press cost.

For less critical installations, there are even less expensive standard stock Isolators. A Selector Chart in Bulletin G-104 gives recommendations for both normal and critical conditions. See Sweet's Catalog Files, or write us for your free copy today.

We'll gladly submit recommendations, without obligation. A half century of experience is at your disposal.

Representatives in Principal Cities

THE KORFUND COMPANY, INC.

48-02A Thirty-Second Place • Long Island City 1, N. Y.

MEN *in the* NEWS

(*Continued from page* 41)

Allis-Chalmers Mfg. Co.—**Arnold I. Thorsen** has been promoted to assistant director of manufacturing of the general machinery division.

Eutectic Welding Alloys Corp.—**W. R. Hillman** recently became assistant to the vice-president in charge of production, **Joseph Quaas** is now manager of the electrode production division, and **Andre Jaccard** is assistant to the executive vice-president.

Colonial Broach Co.—**Hans K. Reitz** was named factory manager to succeed **William Kukuk**, who is now sales representative in Michigan.

Marion Metal Products Co.—Promotion of **Gilbert E. Herr** to succeed the late **J. M. Strelitz** has been announced. **Mrs. Strelitz** and **J. L. Halberstein** were elected to the board.

Westinghouse Electric Corp.—**Andrew M. Kennedy, Jr., E. S. Goodwin,** and **J. S. Jacox** have been appointed assistant general managers of purchasing.

Thew Shovel Co.—Three recent promotions were **R. H. Zeilman** to director of engineering, **M. L. Sheetz** to chief executive engineer, and **O. Von Mehren** to chief design engineer.

Amgears, Inc.—**Theodore V. Purvin** has been named general sales manager.

North American Aviation, Inc.—**Harold Raynor** is now administrative director for the missile and control equipment department.

Aircooled Motors, Inc.—**R. W. Conkle** has been promoted to works manager.

Fruehauf Trailer Co.—Appointment of **E. Q. Smith** as manager of the Avon Lake, O., plant has been announced.

Marquardt Aircraft Co.—**John S. Liefeld** has been appointed factory manager.

U. S. Rubber Co., Tire Div.—**William F. Wrightnour** has been promoted to assistant to the vice president and general manager, while **Patrick H. Kelley** has become director of training.

BUY BONDS

LAKE SHORE

SURFACE PLATES • BASE PLATES

of fine-grained LAKENITE castings . . .

BUILT right, priced right, Lake Shore surface plates and base plates are used by hundreds of firms all over the country. Plates are hand scraped from fine-grained Lakenite grey iron castings to high accuracy.

also:

dynamometer bases
engine stands
layout tables
angle plates
parallels
special castings of all kinds
welding plates

Lake Shore base plates are cast in single pieces up to 10′ x 15′. Standard surface plates made in sizes up to 5′ x 10′. Larger base plate units composed of sections and any special engineering your job might require can be provided by Lake Shore. Contact your nearest representative or send data to:

LAKE SHORE Engineering Company

IRON MOUNTAIN / MICHIGAN

BUY NO RUBBER PARTS

until you've investigated

G-E SILICONE RUBBER!

In the market for rubber parts? Then you'll want to investigate the amazing advantages of General Electric silicone rubber before you buy or specify. Designers find G-E silicone rubber solves problems where conventional rubber fails . . . that it does jobs *no other* rubber can do!

For example, G-E silicone rubber remains flexible from —100 to 500 F and has unusual resistance to weather and chemical attack. This means long-lasting rubber parts for applications heretofore impractical with ordinary elastomers. It means:

- **Increased safety factor**—vital to aircraft
- **Less replacement cost**
- **Less rubber parts inventory**
- **A minimum of customer complaints** due to failure of conventional rubber

And . . . G-E silicone rubber can add important "sales pluses" to your product lines!

Get more information! Why not send today for a free booklet, "Imagineering with Silicone Rubber"? It describes the amazing properties of this material and its applications. Find out how G-E silicone rubber—now three times stronger than early varieties and available in many new forms—is more useful than ever. Just mail the coupon.

G-E silicones fit in your future

GENERAL ELECTRIC

CLIP AND MAIL TODAY!

General Electric Company
Section 342-1C
Waterford, New York

Please send me, free, your new booklet "Imagineering with Silicone Rubber." I am interested in G-E silicone rubber for:

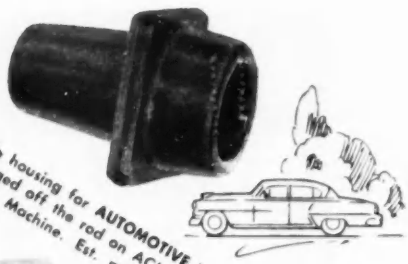
( ) Seals and gaskets
( ) Wire and cable insulation
( ) Tapes and cloths
( ) Sponged products
( ) Belting
( ) Boots, sleeves, bellows
( ) Hose and ducting

Name_____

Address_____

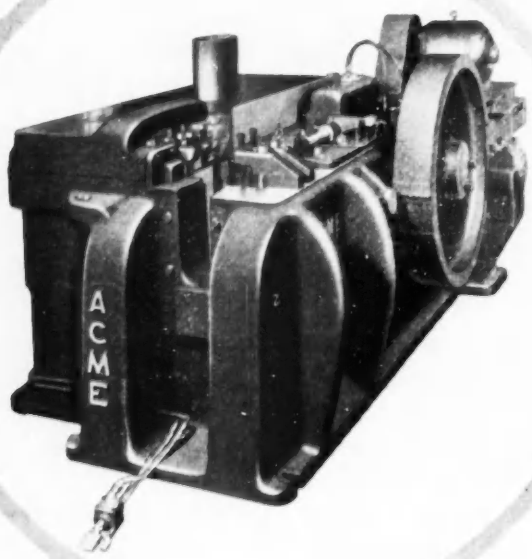
City_____ Zone___ State_____

Upset forgings for **AVIATION** "Jet" blades produced on 1½" ACME XN Forging Machine. Est. production—200 per Hr.

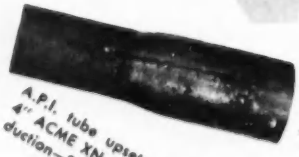


Rear axle housing for **AUTOMOTIVE** industry forged off the rod on ACME XN 3" Forging Machine. Est. production—240 per Hr.

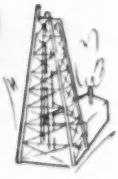
Bevel gear blank for **GENERAL INDUSTRY** forged off the rod on a 3" ACME XN Forging Machine. Est. production—250 per Hr.



Heavy clevis for **FARM MACHINERY** forged on the rod with 2½" ACME XN Forging Machine. Est. production—265 per Hr.



A.P.I. tube upset for **OIL FIELDS** from 4" ACME XN Forging Machine. Est. production—300 per Hr.



Rail anchor for **RAILROADS** forged off the bar on a 2" ACME XN Forging Machine. Est. production—550 per Hr.

...and for YOUR Business Also!

The above production figures on forged parts from ACME XN Forging Machines may suggest cost savings to you in YOUR business. Our seventy-five years of experience is always available. Your inquiry will receive our immediate attention.

THE HILL ACME COMPANY

ACME MACHINERY DIVISION • **1209 W. 65th St., Cleveland 2, Ohio**
ESTABLISHED 1882

"ACME" FORGING • THREADING • TAPPING MACHINES • ALSO MANUFACTURERS OF "HILL" GRINDING AND POLISHING MACHINES
HYDRAULIC SURFACE GRINDERS • "CANTON" ALLIGATOR SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

Ride to greater sales on

Cr-V steel elliptic springs

Heavy-duty truck and bus manufacturers all agree:

Elliptic springs of Cr-V steel contribute a great deal to customer satisfaction, thus to greater sales.

Superior performance has earned this popularity. Elliptic springs of chromium-vanadium steel combine high flexibility, light weight, and low long-run cost with the fatigue strength to give long life under high stresses.

Build this superior combination into *your* heavy-duty automotive equipment—specify Cr-V steel elliptic springs.

And if you have a particularly difficult application problem on the use of alloy steels for heavy-duty springs—or on any other vital automotive components—get in touch with your nearest Vanadium Corporation office. They will be glad to put their experience to work for you.

Call or write today.

MAKERS OF ALLOYS VANCORAM CHEMICALS AND METALS

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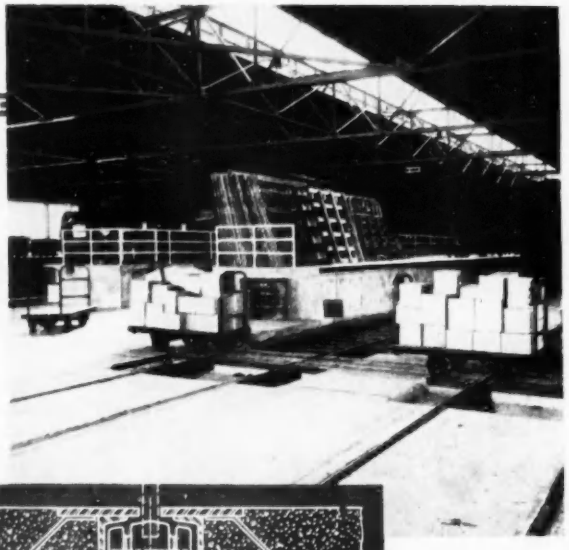
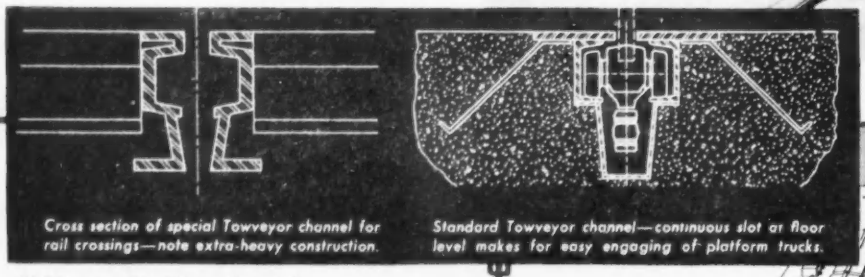
TOWVEYOR

provides conveyor handling of freight on Santa Fe station platforms





Cross section of special Towveyor channel for rail crossings—note extra-heavy construction.

Standard Towveyor channel—continuous slot at floor level makes for easy engaging of platform trucks.

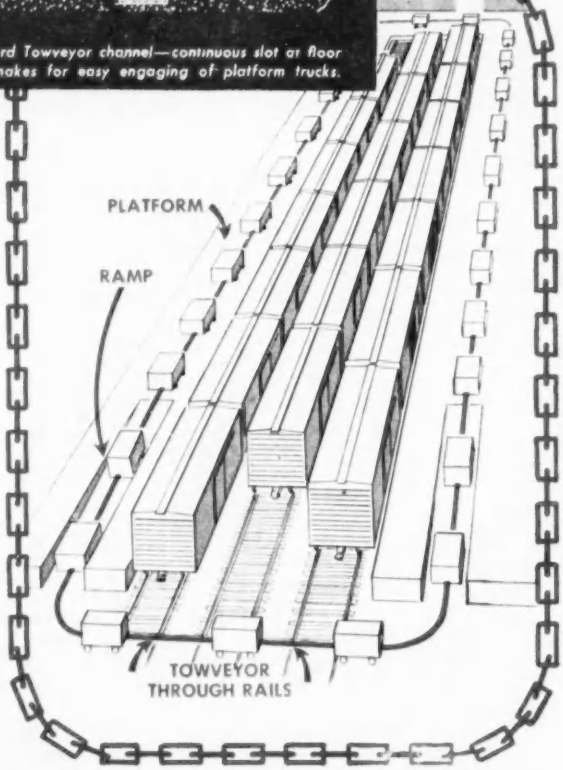
"Keep It Moving"

That is the command in every freight station. Here is how especially designed and installed Towveyor systems at the new Santa Fe Freight Station in Chicago help handle freight faster and easier with minimum cost.

Two Towveyor systems were installed—system "A" (2700 ft. long) serves three outbound tracks and system "B" (2400 ft. long) an inbound track. Combined capacity of these two Towveyor systems is 340 platform trucks, each capable of carrying 500 lbs. of freight. Rate of chain travel is adjustable for selected speeds from 110 ft. to 160 ft. per minute.

It was necessary for system "A" to cross the three outbound tracks in a manner that would not interfere with freight car switching. The efficient answer was removal of a small section from each track and channeling of Towveyor chain through these openings (Santa Fe and Webb engineers collaborated in the development of this unique installation feature). Stopping Towveyor travel permits unhampered and normal switching of cars.

In all other areas the Towveyor chain track is imbedded in the concrete platform floors. This leaves platforms clear of all obstructions for free, easy and faster freight handling operations. It is now possible to have at any given time, 170,000 lbs. of freight automatically moving along Santa Fe platforms—*Towveyors "Keep it Moving."*

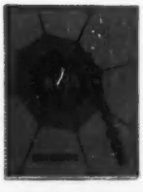


JERVIS B. WEBB CO.

Conveyor Engineers and Manufacturers

8937 ALPINE AVE. • DETROIT 4, MICHIGAN

Send for fully illustrated catalog that provides complete information on Webb floor type conveyors.



OFFICES IN PRINCIPAL CITIES • FACTORIES IN DETROIT, LOS ANGELES, HAMILTON, ONTARIO

Another new development using

B. F. Goodrich Chemical *raw materials*

Photo and data courtesy of Thermoid Co., Trenton, N. J.
B. F. Goodrich Chemical Co. supplies the Hycar rubber only.

Why this HYCAR hydraulic hose has a long and useful life

YOU can see in this picture some of the tough conditions this hydraulic hose, made with Hycar rubber, has to meet—and *does*, to perfection!

One of them is oil, particularly high-pressure lubricants. Another is grease, including compounded greases carrying metallic soaps. Still another is corrosion from battery acid. There are the deteriorating effects of gasoline, plus abrasion from rough handling or dragging around to contend with. And the Hycar hose must remain flexible.

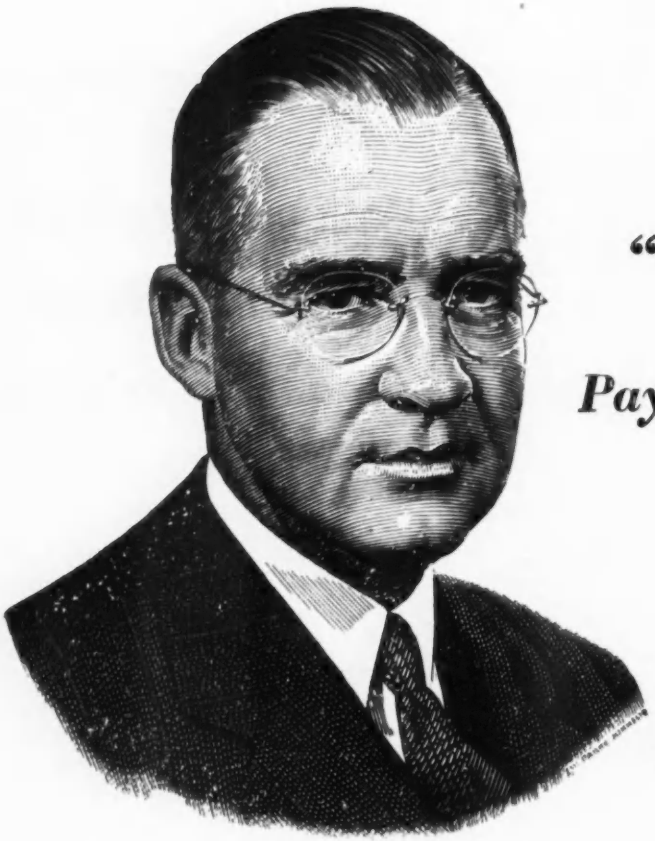
Hycar rubber comes through on every count. For Hycar is resistant to *all* these destructive conditions and more, such as heat and cold, aging and many chemicals.

Perhaps one of the Hycar rubber compounds can do a better job for you, help you improve or develop more saleable products. We'll help with technical information. Just write Dept. HG-2, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Hycar
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors



"...I urge employers to install the Payroll Savings Plan..."

M. B. FOLSOM
Treasurer, Eastman Kodak Company

"Continued saving will play an important part in protecting us against a renewal of inflation. The person who saves contributes to the nation's stability and to his family's security. He can now also obtain a higher return on his investment than he could in the past, because of the improvements in Defense Bonds now offered by the U. S. Treasury. I urge employers to install the Payroll Savings Plan wherever practicable, and employees to take advantage of such plan. By investing regularly in improved Defense Bonds, Americans serve their nation's interests as well as their own."

If your company does not have the Payroll Savings Plan—

Please tear out this page and send it to the "Big Boss." Urge that he read, carefully, Mr. Folsom's superb summary of the Payroll Savings Plan and its benefits for employers, employees and our country.

The following figures should be particularly interesting to anyone not familiar with the wide adoption and the steady growth of the Payroll Savings Plan:

- 45,000 companies offer their employees the Payroll Savings Plan.
- since January 1, 1951, enrollment in The Plan has increased from 5,000,000 to 7,500,000.
- in some companies, more than 90% of the employees are systematic bond buyers—in literally thousands of other companies, employee participation runs 60%, 70%, 80%.
- payroll savers are putting aside $150,000,000 per month in U.S. Defense Bonds.
- the *cash value* of Series E Bonds held by individuals on December 31, 1951, amounted to $34.8 billion—$4.8 billion more than the cash value of Series E Bonds outstanding in August, 1945.

Phone, wire or write to Savings Bond Division, U.S. Treasury Department, Washington Building, Washington, D.C. Your State Director will show you how easy it is to install and maintain the Payroll Savings Plan.

If you have a Payroll Savings Plan, your State Director will show you how to build employee participation through a person-to-person canvass that puts an Application Blank in the hands of every employee. That's all you have to do—your employees will do the rest.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

AUTOMOTIVE INDUSTRIES

The man with the Parker briefcase brings

38 Years' Experience

in metal surface treatment to you

FIRST in the field since 1915

● Only Parker has it! Experience gained in planning metal surface treatments in thousands of plants. Experience matured in meeting and solving problems of installation, application and performance day after day for 38 years. Experience enriched by a continuing research program of improvement and discovery.

In the Parker man's briefcase — and in the knowledge and skill of production, engineering, research, and testing staffs which back him up — are the answers that will mean savings and satisfaction for you when you need a metal surface treatment in your plant.

For rust control, paint base, wear resistance, metal cleaners, aids for drawing and cold extrusion, call in the man whose briefcase is packed with 38 years of success. Call Parker!

*Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

Parker
RUST PROOF COMPANY
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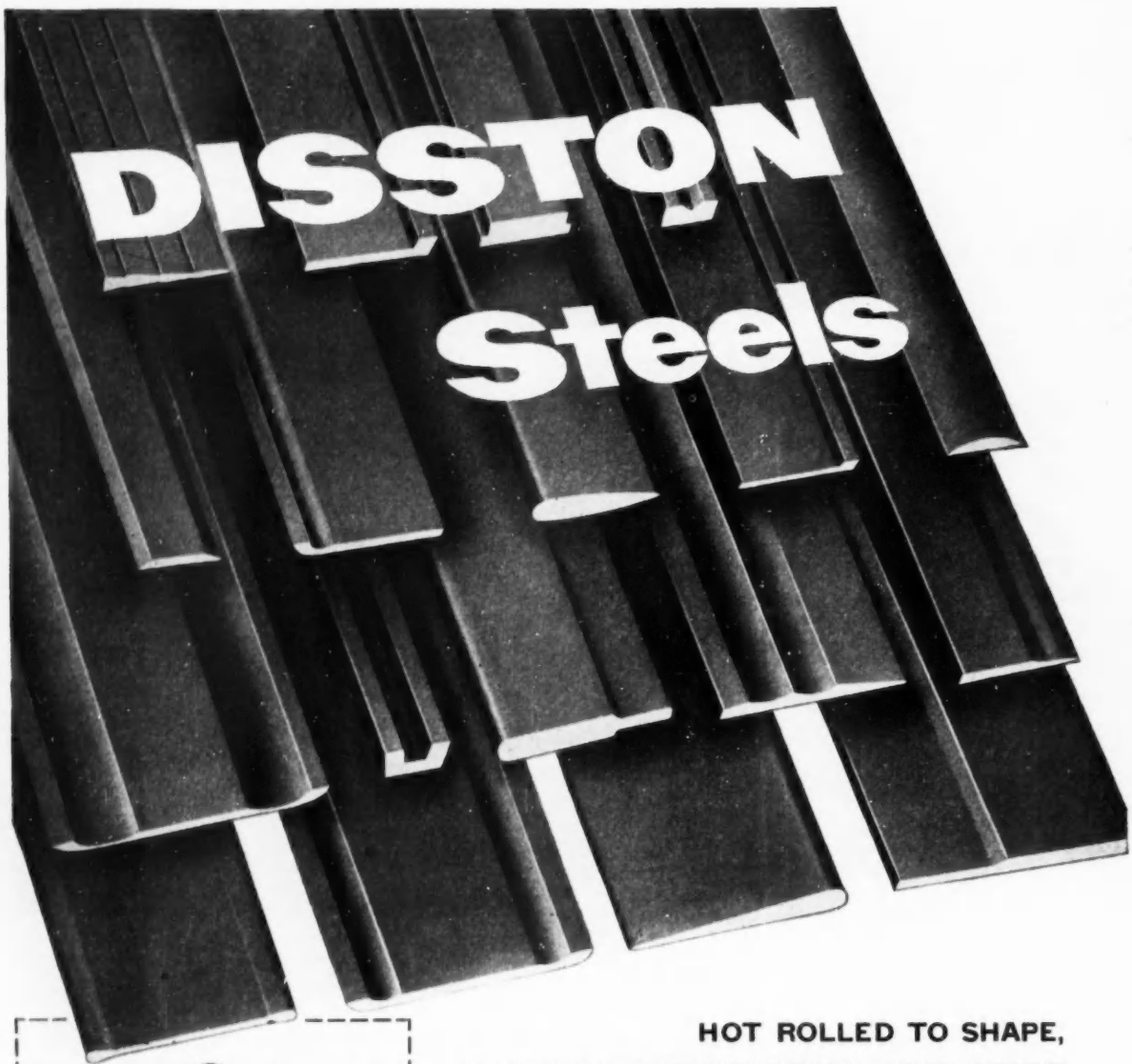
BONDERITE—corrosion resistant paint base

BONDERITE AND BONDERLUBE aids in cold forming of metals

PARCO COMPOUND rust resistant

PARCO LUBRITE—wear resistant for friction surfaces



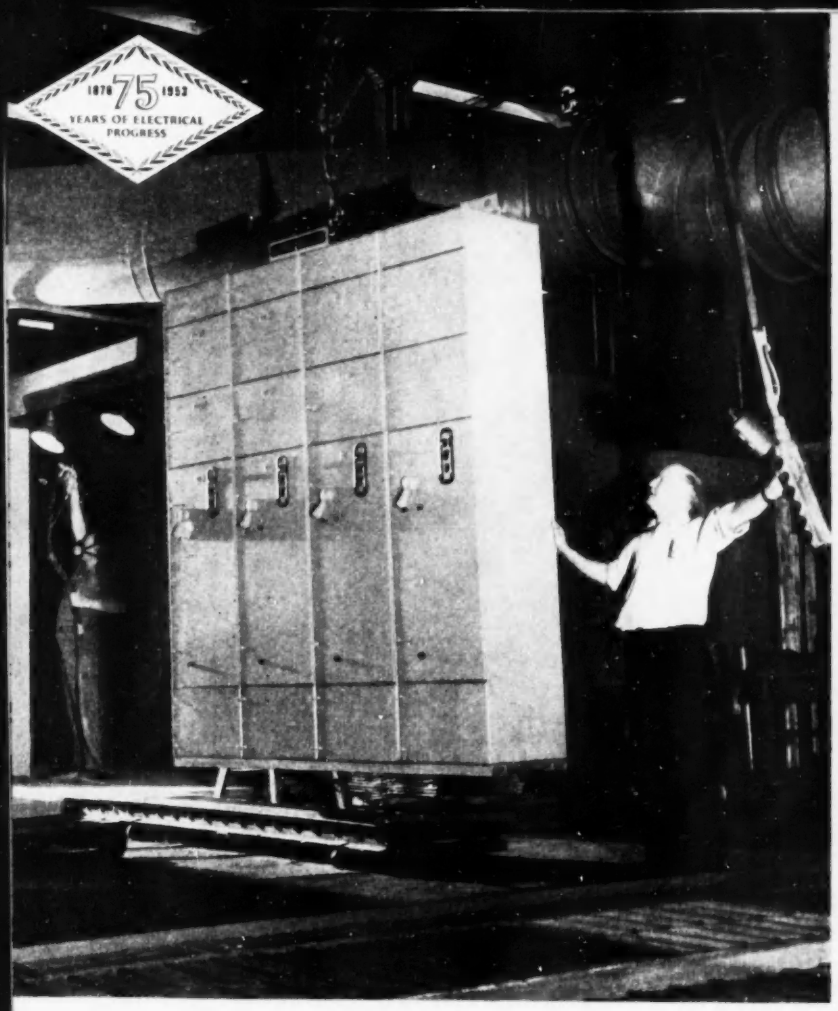
A few of the many forms of Disston Hot Rolled Shapes now being used in industry.

HOT ROLLED TO SHAPE, GIVE YOU A PRODUCTION HEAD-START

It may be money-saving news to you that Disston can relieve you of much of the overhead in machining by delivering Disston Hot Rolled Steel Shapes to meet or closely approximate your specifications. These steel- and labor-saving shapes can be rolled in a variety of forms that should easily offer production short-cuts to you. Tolerances are close, and finishes are exceptionally fine. Disston Shapes can be made in either alloy or carbon steels, both electric and open hearth grades. Disston engineers and metallurgists are ready to work with you today. Write us, giving your needs.

HENRY DISSTON & SONS, INC.

231 Tacony, Philadelphia 35, Pa., U.S.A.



INDIVIDUALLY PLANNED motor control centers are manufactured and delivered completely wired and ready-to-install from this new General Electric motor control center production line.

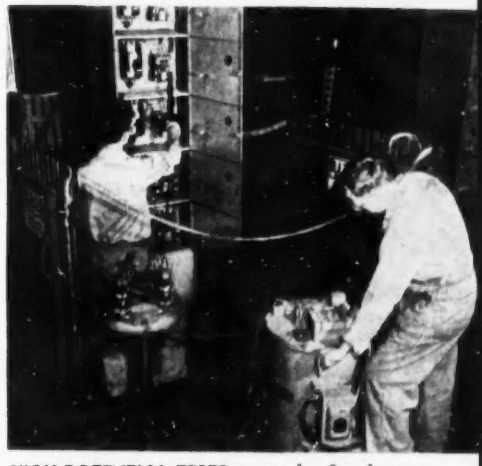
EASY TO INSTALL, inspect, and interchange starters, which are assembled as complete units, including pushbuttons and wiring terminals for easy front-connecting. Door swings more than 90°

New G-E Motor Control Center Has Easiest-to-Interchange Units

The new General Electric motor control center is the most up-to-date equipment for the centralized control of a-c motors up to 200 horsepower. Each control center is planned for the job it is to handle, but it can rapidly be modified to meet changed requirements. Standard units can be easily interchanged or substituted, new units can be quickly added. Units may be mounted back-to-back in same standard enclosure. Master terminal boards may be located at either top or bottom of cabinet.

ACCESSIBLE. Installation is simple—just a matter of sliding the unit into its compartment. Stab-on connectors grab the vertical bus. Wiring is easy because even pushbuttons and terminals are mounted on the unit frame for simple front-connecting. Doors swing more than 90°, so unit can be lifted out of compartment for accessibility from all sides. Barriers between units can be slipped out, making a four-inch wiring trough. Master terminal boards can be swung out of place for connecting without "fishing" of wires.

FOR MORE INFORMATION, contact your nearby General Electric apparatus sales office, authorized G-E agent or distributor, or write Section 781-1 for GEA-4979A today. *General Electric Company, Schenectady 5, New York.*

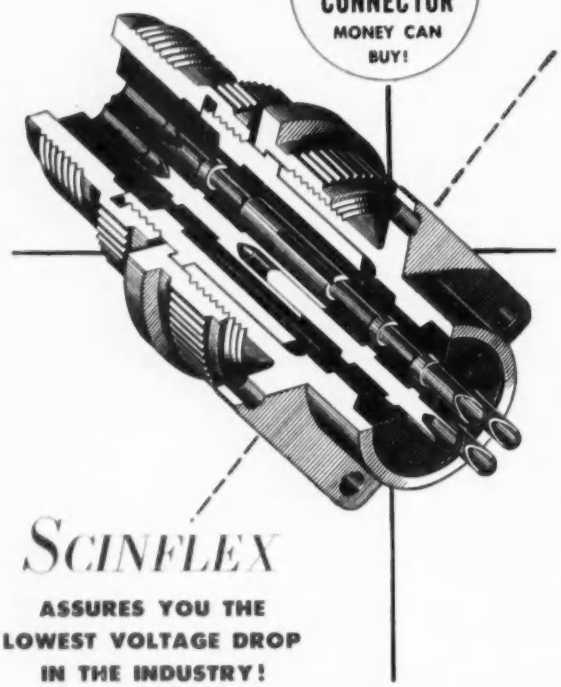


HIGH-POTENTIAL TESTS are made of each completed General Electric control center before shipment, to assure adequate short-circuit protection, safety for plant personnel and equipment.

You can put your confidence in—

GENERAL ELECTRIC

The Finest
ELECTRICAL CONNECTOR MONEY CAN BUY!



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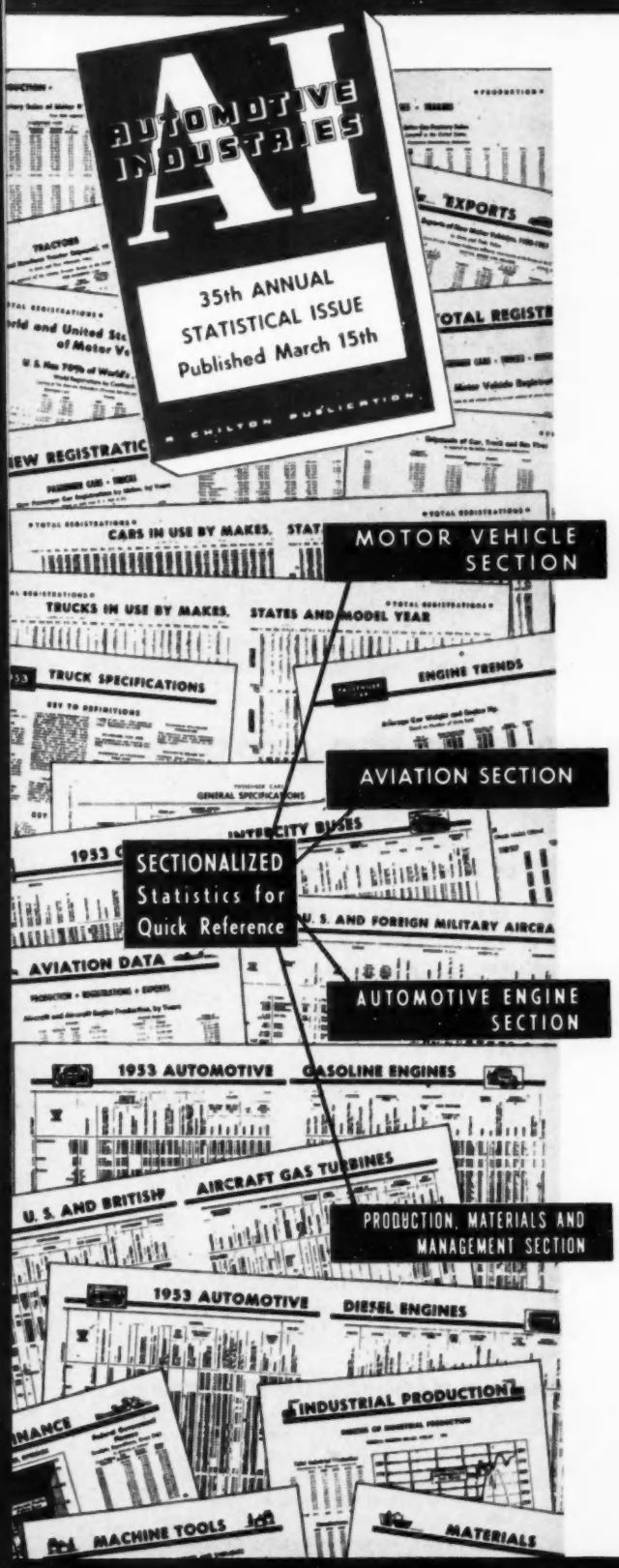

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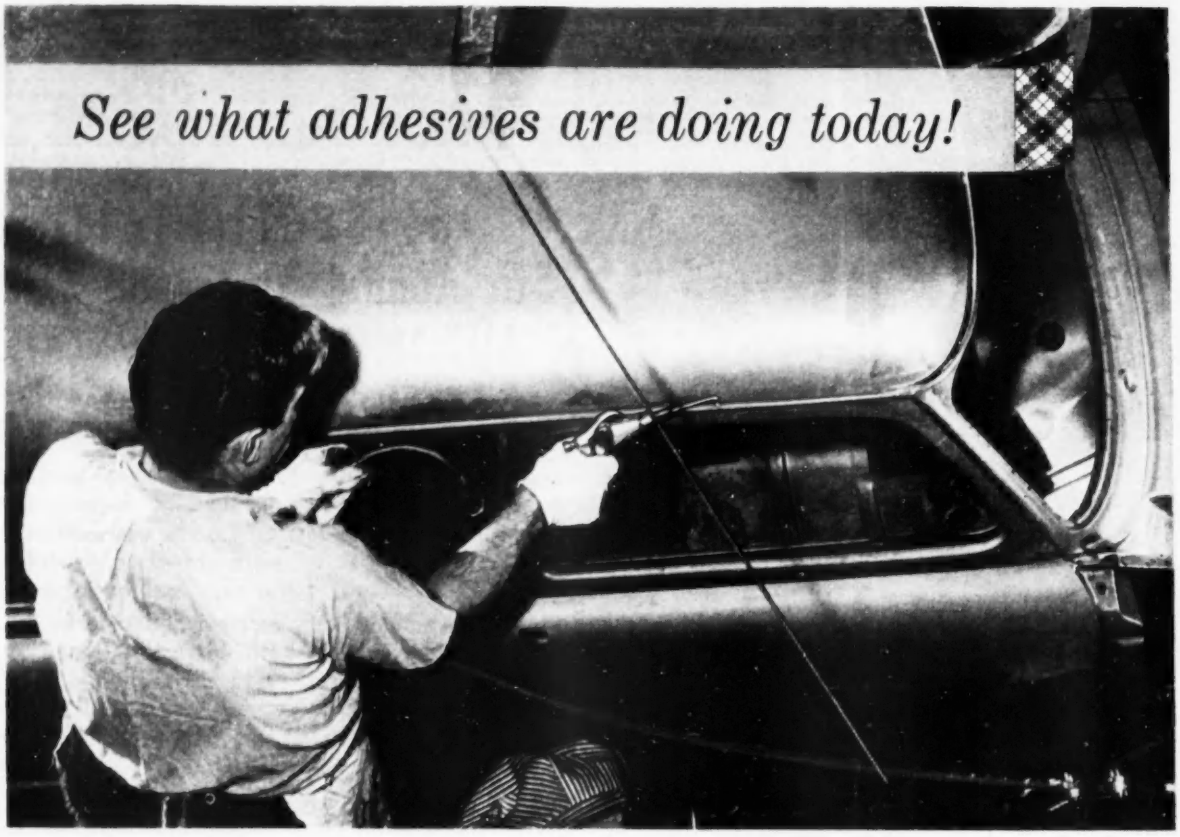

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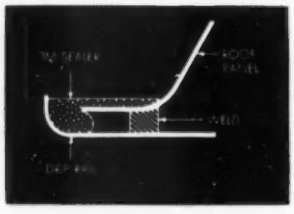

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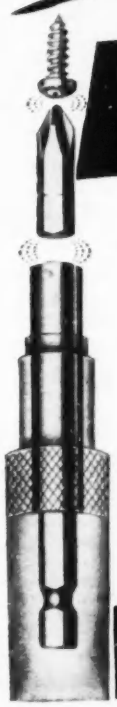

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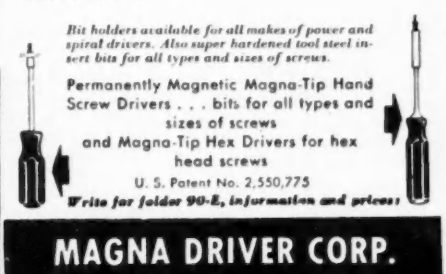

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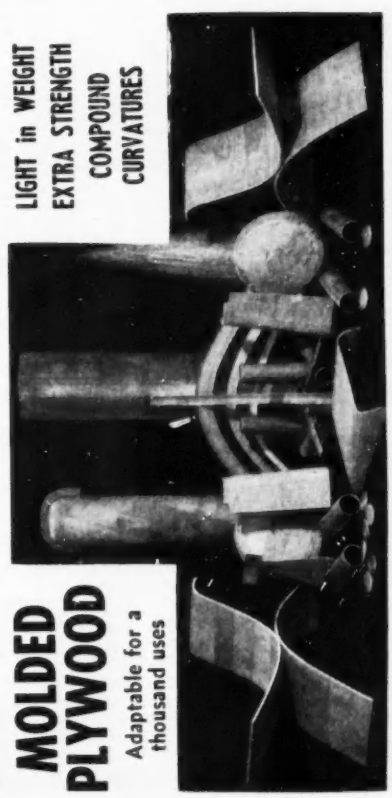

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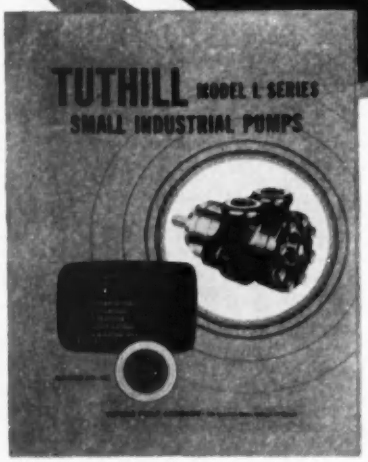

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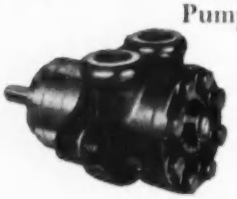

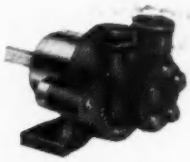

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For pressure lubrication. For hydraulic mechanisms. For oil burning service.

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For liquid transfer on non-corrosive liquids and for circulating service.

TUTHILL MODEL CK Pumps
Ball-bearing construction for hydraulic service.

TUTHILL MODEL M Pumps
For coolant service, with automatic internal by-pass.

TUTHILL MODEL R Pumps
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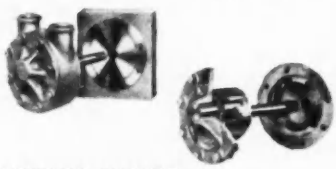

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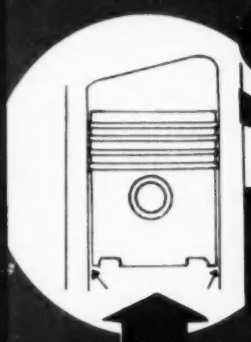

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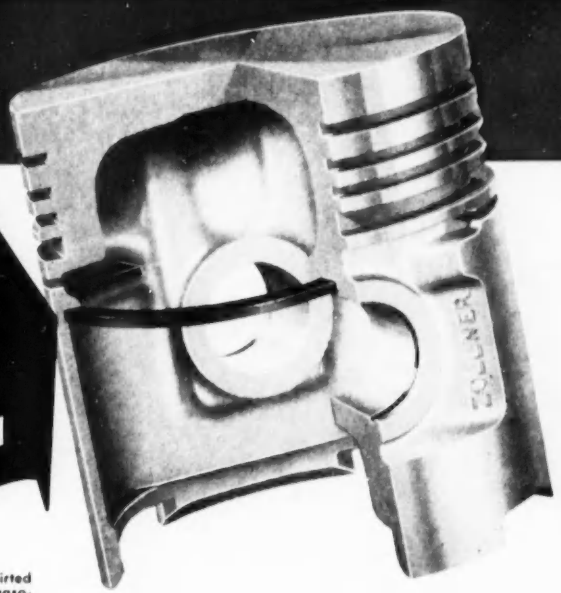

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